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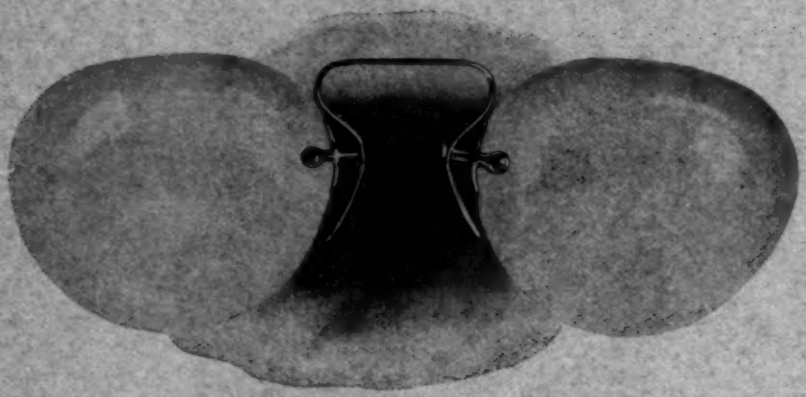

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AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 5 AUGUST, 1922 No. 8

HERNIA THRU TENON'S CAPSULE WITH EXTRUSION OF ORBITAL FAT A BIRTH INJURY.

WALTER SCOTT FRANKLIN, M.D., F.A.C.S. and WARREN D. HORNER, B.S., M.D.

SAN FRANCISCO, CALIFORNIA.

This is the report of a case of deformity of the lids apparently due to birth injury. The condition produced appears not to have been previously described. It was remedied by an appropriate operation. Contributed from the department of Ophthalmology of the University of California.

Birth injuries of the ocular structures are not infrequent, and may range in severity from a transient edema to actual evulsion of the globe or serious intraocular damage. The case here presented, while mainly cosmetic, is of unusual interest because of its rarity, and because it was correctly diagnosed before operation.

CASE HISTORY: A. W., male, aged 5 1/2 years, was referred by Lieut. O. R. Goss, Medical Corps, U. S. Navy, January 9, 1922. Complaint: Swelling of both lids.

Family History: Child is an only son. The parents are living. The father, a naval officer, was recently injured thru accident on shipboard. Was previously in good health. The mother is well. There is no history of miscarriage. There are no familial diseases. The child had instrumental delivery and the skull was fractured at birth. Further details of birth are not available.

Past diseases include pertussis, aet. 9 months. A valvular heart lesion was diagnosed, aet. 3 years. The child has been well for the most part, but never robust. His color has always been pale and a certain puffiness beneath the eyes has caused repeated heart and kidney investigations. Tonsils and adenoids have been removed.

The eye history dates from birth. The mother states that during instrumental delivery, the child suffered a fractured skull and was not expected to live. The eyes could not be seen for three months on account of swelling. Following this, the edema slowly receded. There has been no apparent change in the eyes during the past three years.

The mother comes for an opinion on the subconjunctival swellings. She states that she has had the patient examined several times before with varying recommendations. The child's vision has always seemed normal. R. 0.4, L. 0.6, illiterate.

Right eye: There is considerable puffiness beneath the eye. A mass depresses the contour of the upper lid giving the effect of a partial ptosis. This tumor is a regular swelling appearing beneath the ocular conjunctiva nasally and above, near the upper fornix. It has the color of conjunctiva with a translucent yellow tinge. It does not pulsate and is freely movable beneath the conjunctiva. There is no injection or induration. The conjunctiva itself is pale. A vertical fold of conjunctiva covers the edge of the cornea when the patient looks to the left. The orbital rim is not involved.

The *left eye* shows an analogous condition. A soft kidney shaped mass lies beneath the ocular conjunctiva near the inner canthus. It curves from approximately 2 mm. above the canthus downward and outward almost to the limbus. It is mobile, regular, and has a pale yellow color. The ocular

movements are normal. Both fundi are normal.

The *general physical examination* proved to be negative with two exceptions. The skull showed a depression along the coronal suture, probably secondary to the forceps injury. A previous X-ray of the skull was said to have been negative. There was a systolic cardiac murmur. Wassermann's test was not done. The urine was negative.

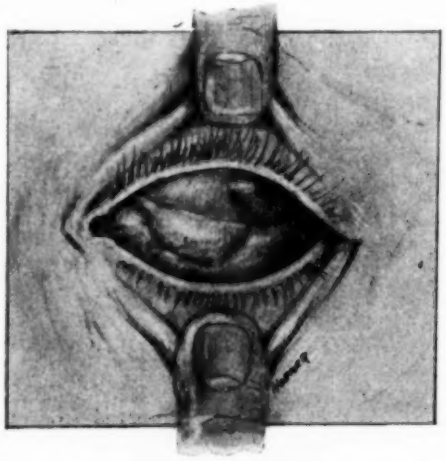

Fig. 1. Left eye showing subconjunctival tumor mass.

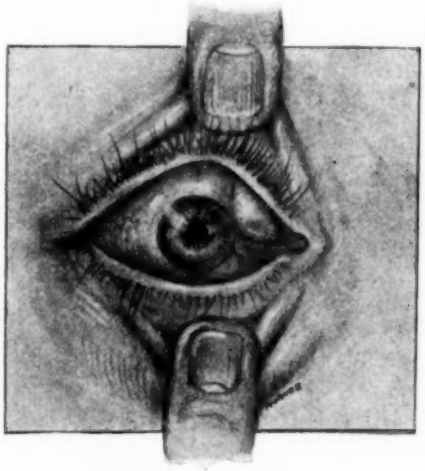

Fig. 2 Right eye showing subconjunctival tumor mass.

The eye condition was diagnosed as a rupture of Tenon's capsule with extrusion of orbital fat.

Operation was advised to excise or replace the fatty masses. Operation was performed at Children's Hospital under general anesthesia.

The left eye was operated upon first. The conjunctiva at the lower inner quadrant, overlying the tumor, was split with scissors and retracted by stay sutures and retractor. This exposed the tumor mass which had the appearance of orbital fat. Blunt dissection disclosed a smoothly lined tube in which the fat lay admixed with a certain amount of rather vascular fibrous tissue, the whole extending into the depths of the orbit. Traction on the mass was transmitted deep within the orbit and considerable retraction occurred when the tension was removed. There was no apparent connection with the internal rectus and this muscle was not exposed. The herniated mass was clamped, ligated and resected. The stump immediately retracted into the orbit. The tube-like rent in Tenon's capsule, i. e., hernia sac, was sutured with a mattress stitch of No. 1 catgut. A conjunctival suture of black silk closed the wound.

Right eye: Incision was made thru the conjunctiva at the superior nasal aspect over the tumor. The fat was loosened by blunt dissection from the hernia sac and abscised. Tissue accompanying the sac (externally) was left in situ. The gap in Tenon's capsule was closed by interrupted sutures of fine catgut. The conjunctiva was closed with black silk, and the usual yellow oxid salve dressing applied.

Both eyes were bandaged for four days, when the stitches were removed. There was but slight postoperative swelling and healing was uneventful. The operative result proved excellent. The masses were entirely removed and the conjunctiva healed smoothly. Eye movements were free in all directions.

The tumor masses removed measured 8x10 mm. for the right eye, and two pieces each 10x10 mm. for the left. Dr. G. Y. Rusk, Pathologist to the University of California Hospital, gave the following report:

"Microscopic examination of numerous sections shows tissue composed of fat, thru which run bands of fibrous tissue apparently more marked than would normally be present. No muscular tissue was observed, and no inflammatory reaction. Diagnosis—fat with fibrosis."

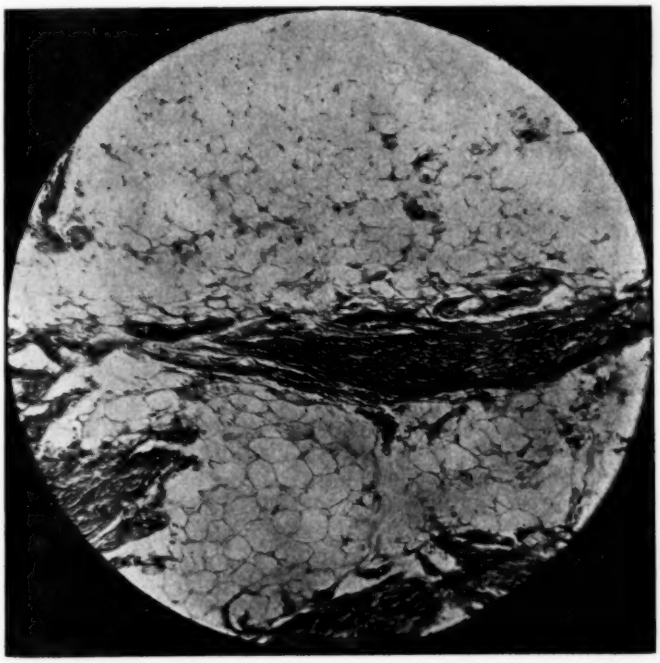

Fig. 3. Photomicrograph showing fatty structure of tumor mass.

A representative section is shown by microphotograph.

We determined to investigate the formation of the hernia. In the cadaver it was found that a probe could be readily passed from the back of the orbit to lie beneath the conjunctiva, especially in the spaces between muscles. The capsule of Tenon is thin, especially anteriorly, where it fuses with the conjunctiva. Pressure on the orbit from a forcep blade might easily exert sufficient pressure to rupture this capsule and produce a subconjunctival fat hernia. Moreover, a blade could lie over each eye causing a bilateral injury as resulted in this case. That the traumatism was severe is evident from the amount of periocular swelling that occurred after birth. It is unfortunate that we are not able to get the obstetrician's notes on the case.

A careful survey of the literature has not shown a similar case.

LYMPHOSARCOMA OF THE ORBIT PROBABLY ARISING IN THE CHOROID.

ISAAC HARTSHORNE, M.D., F.A.C.S.

NEW YORK, N. Y.

This is the report of a case presented at the Eye Section of the New York Academy of Medicine, November 21, 1921, with the report of the pathologic findings by Leila Charlton Knox, M.D. The case terminated fatally six weeks after it was presented.

John R., now 3 years old, the first child of healthy parents, was brought to me May 9, 1919, at six months of age, with an acute conjunctivitis, with much chemosis in the left eye. Duration, four days. The cornea was clear, the discharge watery, and the iris apparently normal. Culture later reported negative. Ordered:—Cold fomentations, argyrol 25% every two hours, and atropin 1/2% twice a day. There was no previous history of exanthemata or any other illness.

May 12, 1919: Conjunctivitis improved; pupil moderately dilated and no iritic tags present; iris appeared muddy and fibers thickened; cornea steamy, but without deposits on Descemet's membrane: Practically no circumcorneal injection. Tension normal with fingers. Ophthalmoscopic examination:—No red reflex, and fundus details obscured. Oblique illumination showed a yellowish reflex from the whole fundus. No abnormality seen in right fundus. The same treatment was continued. Wassermann negative, and otherwise a perfectly normal child.

May 20, 1919: Consultation at the Manhattan Eye and Ear Hospital with Dr. Charles W. Kinney: Diagnosis, pseudoglioma (?). Advised enucleation, which was refused.

During the next three months, the eye went thru a typical interstitial keratitis, which was treated with atropin, and mercury and potassium iodid, on general principles.

Sept. 10, 1919: No inflammation present; cornea opaque and phthisis bulbi setting in.

Believing that a tumor of some kind was present at the posterior pole of the globe, and as the eye could not possibly improve, enucleation was strongly urged and again refused. He then passed out of my hands and did not return to me until May, 1921. During this time he was under the observation of an ophthalmologist in New York City who, I am told, felt the advisability of keeping the globe in place as long as possible, for the sake of development of the orbit. I only regret that he did not get in touch with Dr. Kinney or me, as the original picture might have changed his opinion. At some time during this period Dr. Arnold Knapp saw the patient and advised immediate enucleation.

In May, 1921, he was brought back to me with the contents of the left orbit bulging so that the upper lid just barely closed over the mass. The details of the eye were indistinguishable in a smooth faintly brownish mass, with a yellowish area about one-quarter inch in diameter in the lower cul de sac at the external canthus. This mass was not movable with rotation of the other eye, and resisted palpation, as if filling the whole orbit. It was explained to the family that it was probably too late, but that immediate operation was imperative. Right eye was not examined at this time.

On May 23, 1921, at St. Luke's Hospital, with the assistance of Dr. Alfred Wiener, I exenterated the left orbit to the periosteum, to a point back of the tumor mass and almost to the apex of the orbit. During an uneventful recovery, on June 10th, Dr. Wm. B. Long, gave the orbit one exposure to radium.

On July 11, 1921, in the hope of getting a socket for an artificial eye, I made, with Dr. Wiener's assistance, a pedunculated graft from the brow to the lower cul de sac. The graft "took," and after healing held a shell for three weeks. An artificial eye was then fitted and used for about five weeks until early in September, when it could

FIG. 1. GROSS SPECIMEN SHOWING EYE, TUMOR AND ORBITAL CONTENTS

FIG. 2. HORIZONTAL SECTION OF EYE WITH INTRA- AND EXTRAOCULAR PORTIONS OF TUMOR. INVASION OF THE SCLERA IS SEEN ON THE RIGHT

no longer be inserted, and it became evident that something more than granulation tissue was present.

Dr. John M. Wheeler kindly saw the case with me, and felt that no further plastic operating could be done. Since September 18, 1921, Dr. Long has given fortnightly X-ray exposures over the left orbit; and, since October 15th, also over the right. The X-ray has been given on alternate weeks,—one week over the left, and the next week over the right orbit. In spite of the X-ray treatment, the mass is growing steadily, so that the left socket is closed by the growth from the orbit, which has spread into the surrounding bony walls and bulges over the temple and frontal region, and extends to the internal canthus of the right orbit.

The findings in the right eye, which have been present several months, are interesting, tho not entirely explainable. Externally:—the eye appears normal, and the pupil is active to light and accommodation; media, clear. Fundus:—nerve appears normal; vessels not remarkable. In the superior temporal region there is an extensive area of atrophy of the choroid, without elevated patches or exudate. A few smaller patches of choroidal atrophy are present to the nasal side of the fundus. Dr. Colman W. Cutler thinks these areas of choroidal atrophy may be due to some pressure or irritation effecting a trophic disturbance of this region. To the nasal side, near the superior nasal vein, there is a circumscribed elevated area which can be seen with a plus 12 lens, which is about the size of the disc, dark in color, and without vessels passing over it. Probably this is a mass behind the choroid, of metastatic origin, and, I think it is increasing in size.

On palpation of the right eye there is slight tenderness and slight resistance as of pressure from behind the globe.

The boy is becoming progressively more pale and peevish, and complains of pains in the arms and legs. While this case represents a failure, from lack of cooperation on the part of the family, there is much about it that is instructive.

The patient died January 15, 1922, in a convulsion. Autopsy refused.

REPORT ON PATHOLOGY.

LEILA CHARLTON KNOX, M.D.

Macroscopic Examination: The specimen consists of left eye and orbital contents. (See Fig. 1.) It measures 3.5 x2.7x2.5 cm., exclusive of a small amount of fascia, muscle, and the lacrimal gland. Traces of the conjunctiva surround the globe and tumor. The main mass is a solid nodular tumor which projects forward from the inner canthus, pushing the eyeball downward and outward. The nasal portion of the sclera appears as a smooth, opaque, yellowish membrane, and at the side of it a small area of the cornea is barely recognizable, being also opaque and injected. The posterior portion of the sclera, about 1.5 cm. on each side of the stump of the optic nerve, appears relatively normal, but elsewhere it is noticeably thinned. No gross involvement of the nerve by the tumor is seen.

A horizontal section of the eyeball shows that no other normal structures are present, and that the sclera is also much thinned anteriorly, where the tumor mass is most closely adherent. The lens, iris, ciliary body, and retina cannot be identified, but pigmented fragments of choroid are scattered thruout the posterior portion of the tumor (See Fig. 2).

The bulb is completely filled with a soft cellular neoplasm, greyish in color, except for scattered foci which are yellowish, granular, and appear necrotic. The extraocular mass has a maximum thickness of 1 cm., is more homogeneous, and does not show degeneration.

Microscopic Examination: Sections of the globe show that it has been completely filled with the tumor, destroying almost all normal structures. Detached choroidal cells may be seen embedded in the growth. The sclera is widely invaded. The tumor is composed exclusively of rather small round or oval cells, in which cytoplasm can only infrequently be made out. (See Fig. 3.) Stained with hematoxy-

lin and eosin, they very closely resemble lymphocytes, but are often slightly larger and more irregular in form. Mitoses are frequent. The stroma is extremely scant, and certain areas within the globe are calcified, tho not ossified. The tumor outside of the eyeball is better preserved, more vascular, has a more delicate and cellular stroma, but is not calcified. The limiting capsule is very thin, but no infiltration of the orbital fat could be demonstrated. Nodular collections of lymphocytes are found thruout the stroma of the lacrimal gland, but whether or not they are neoplastic it is impossible to state, so closely do many of the tumor cells resemble those of inflammatory exudates.

In studying a tumor in this location, neuroglia is of course to be excluded as a source, but unfortunately Unna's pyronin-methyl green stain for the fibrils could not be carried out, due to their inadequate fixation while the drawings of the gross specimen were being made. The Bielschowsky stain, however, does not show such fibrils, as the more delicate portions of the reticulum are clearly prolongations of the stroma cells, and not a part of the cells of the tumor. The general arrangement of the cells is, however, quite unlike that described by Ribbert as typical of many intraocular gliomata, namely the striking perivascular distribution of the cells with a thick mantel around the capillaries, but the rest of the structure mainly necrotic. Also the cells do not form rosettes as neuroepithelium characteristically does in tumors. Were either of these formations present, the diagnosis of glioma could readily be made, irrespective of the other morphologic details which occur less frequently in tumors of neural origin.

If the size and arrangement of the cells in this tumor are compared with those of other lymphosarcomata occurring in children, it will be seen that there is little morphologic difference. For example, Fig. 3 (below) shows a portion of such a tumor of the mediastinum, which caused the death of a child, ten years of age, by pressure on the trachea.

The cells are very similar to those of the orbital one in size and form, and in both tumors they are diffusely scattered with no characteristic arrangement. The stroma is negligible in each. The apparent difference in cellularity is explained by the variation in thickness of the sections.

LITERATURE.

Lymphoid tumors arising within the eyeball are not described, and the possibility of an origin close to the sclera in the orbital tissue and an early penetration of the coats must be considered. However, lymphoid tissues composed of germinal follicles, round cells and sinuses do not exist normally in the orbit either; but the lymph vessels of the ciliary body are an important part of its mechanism, and it is conceivable that a deposit of lymphocytes might occur there as an abnormal or pathologic structure. The literature contains references to a number of cases of both benign and malignant lymphomata of the orbit and lids, the former frequently bilateral and the latter very rarely so.

Rückel described such a case, the tumors occurring symmetrically in both lower lids of a girl seventeen years of age. The tumors had first been noted at the age of four, and growth had been slow and progressive for thirteen years. The masses were enucleated and found to be lymphomata with normal follicles, tho also with some cyst formation.

Seven other cases of this type are cited, as well as thirteen of the symmetric pseudoleukemic variety. Some of the latter are probably due to systemic infections, and hence belong probably to the Hodgkins' group, while on the other hand, some have pursued a malignant course, thus casting some doubt on the etiology of the group.

Other bilateral tumors are those of true leukemic nature, but these are no more frequent in the orbit than elsewhere, and are not necessarily related to the other lymphomata.

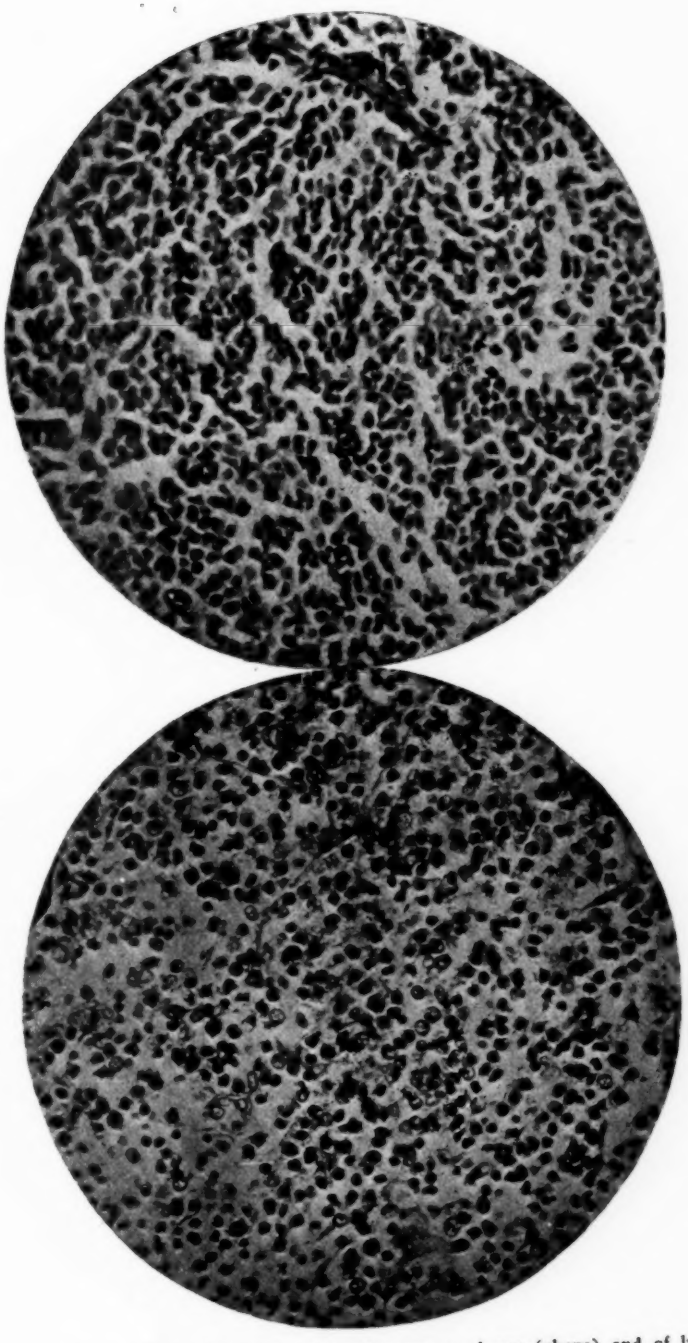

Fig. 3. Photomicrograph of lymphosarcoma of eye (above) and of lymphosarcoma of mediastinum (below). Comparison of these both magnified x 577 shows the similarity of morphology.

Unilateral lymphomata are also described, tho they are rarer than the bilateral ones. Early cases were reported by Chauvel, Coppez, and Varatges, and more recently by Würdemann, Oliver, and Fleischer and Scherer. Oliver removed a retrobulbar tumor from the orbit of a man of 57 years, who gave a history of diplopia since the age of 30. A visible mass had been present above the eye for three months. Prolongations of the growth extended back into the apex of the orbit. Examination showed that the tumor was a lymphosarcoma, but unfortunately the late clinical result is not given.

Fleischer and Scherer were able to find reports in the literature of only two cases which they considered unquestionably lymphosarcoma of the orbit, that of Oliver cited above, and another by de Vincentiis cited in Axenfeld-Fick's Pathologie des Auges. The patient seen by these writers was a soldier forty years of age, discharged from the late war in December, 1918, after four years of service. At this time a slight inflammation of the left eye was present. This became worse until February, 1919, when the tumor became evident. This was removed thru an incision in the upper lid, and found to be attached to the supraorbital periosteum. Microscopically this tumor so closely resembled an inflammatory exudation of round cells, that no prognosis could be assured. In two months, however, a recurrence of considerable size had taken place and this, also, was removed at operation. Exophthalmos and swelling of the lids followed, and the patient suffered much discomfort until three months later, when exenteration was performed. The immediate result was satisfactory, but the subsequent course is not known.

All of these occurrences are of great interest in showing that lymphoid tumors may, and many times have, occurred in tissues where lymph nodes are not found normally, and this is probably due to the fact that it is the most mobile type of tissue and variable in its distribution. Moreover, lymphosarcomata are found in other situations where they can not be explained on anatomic grounds, as in the testis. In this gland a few have been described, probably not more than twenty, but their morphology and behavior have been, as in this case, precisely that of the same class of tumors when they are primary in other parts of the body. In the testis, the possibility of a derivation from the lymphoid tissues of a teratoma has to be considered as, indeed, it does in the present instance. Confirmatory evidence, such as the finding of fetal tissue or organs in either testicular or orbital growths, is, however, lacking.

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EXOPHTHALMOS IN EXOPHTHALMIC GOITER; A STUDY OF 400 CASES.

ISRAEL BRAM, M.D.

PHILADELPHIA, PA.

This is a summary of the course, symptoms and diagnosis of exophthalmic goiter with especial reference to the exophthalmos. The results of treatment upon the exophthalmos and other eye symptoms are also illustrated by a series of cases.

In the light of our present knowledge of exophthalmic goiter, the definition of this affection should read somewhat like this: *Exophthalmic goiter, (Graves' disease, Basedow's disease, Parry's disease, Flajani's disease, hyperplastic goiter, etc.,) is a chronic, rarely an acute dysfunction of the vegetative nervous system and the endocrin, organs, characterized by emotionalism, tachycardia, tremor, increased catabolism, dermographia, weakness, and usually also by exophthalmos and thyroid enlargement.* It is well to emphasize that exophthalmos and goiter are usually, but not always, present. In addition, the experienced clinician will elicit a history in which characteristic predisposing and exciting etiologic factors are more or less constant; also, he will find in the symptomatology certain gastrointestinal, genitourinary, respiratory, and miscellaneous symptoms commonly present in the typical syndrome of this disease. The essential fact to be remembered is, that tho a swollen thyroid and bulging eyes assist to render diagnosis an easier task, the absence of these signs does not preclude the presence of the disease.

TIME OF OCCURRENCE OF EXOPHTHALMOS.—I do not concur with Claiborne[1], who contends that exophthalmos is the first symptom to occur in exophthalmic goiter. Many subjects of this disease never present exophthalmos. Exophthalmos is, in the vast majority of instances, the first *eye* sign to be observed, if the patient is to present eye manifestations at all. Occasionally, an inconstant von Graefe's sign will precede the appearance of proptosis, and more rarely, the "hitch sign"[2] of the upper lid may be observed. Tho occasionally a patient will appear before his physician with exophthalmos as the only complaint, a careful examination will reveal the presence of heart hurry, tremor, dermographia, and other evidences of Graves' disease, which have developed prior to the exophthalmos, and which have occurred in such an insidious fashion as to have escaped the patient's attention.

The earliest occurrence of exophthalmos is seen when, following a sudden intense emotional strain, there is an acute onset of the disease. Thus, in a railroad accident, an earthquake, a conflagration, a shipwreck, and other situations in which life is in great peril, the picture of terror in an individual, with its staring eyes and trembling, the fleeting heart, the cold, clammy skin remains, becomes chronic, and the syndrome of the disease is complete. For example, a man of forty-five, while driving an automobile, suddenly struck a ditch in the road which wrecked the front part of his car. He was thrown with extreme violence, and when he was taken home, the family noticed that his eyes were protruding, his neck swollen, and skin covered with profuse perspiration. There was trembling all over, the patient at the same time complaining bitterly of palpitation. The condition persisting, the diagnosis of Graves' disease was readily made. A girl of eighteen, while enjoying herself in an amusement park, was thrown from a carrousel. She was taken home in a state of hysteria, and within a day or two, exophthalmos and all the other evidences of Graves' disease developed. A man of forty-seven was a passenger in an elevator which dropped nine floors. Tho he escaped without a scratch, the extreme terror of the experience persisted, and a diagnosis of typical Graves' disease was

made within a few days of the occurrence. A man of thirty-two, while employed in a munition factory during the war, heard an explosion which occurred in a neighboring building. He fell to the floor in a faint, and when he was examined, he was discovered to be in a state of acute Graves' disease. Many other illustrations could be given to show that exophthalmos could occur simultaneously with the other symptoms characterizing the disease.

Course of Exophthalmos in Graves' Disease.—In patients presenting exophthalmos during the disease, the following is the usual course of events: More or less insidiously, the patient is observed to become restless and emotional, there may be palpitation on slight exertion, a feeling of trembling and weakness in the lower limbs, excessive moisture of the skin, and a beginning loss in weight. Soon it is noticed that when the patient enters into conversation or concentrates attention upon an object, the eyes present an unusual stare, a rim of sclera appearing above and below the cornea. These signs and symptoms becoming aggravated, the relatives and friends begin to remark that the patient is "queer." The physiognomy assuming in course of time the characteristic expression of fright, the more timid acquaintances, especially children, may hesitate to come near him.

Especially is this true when it is observed that simultaneously with the occurrence of distinct exophthalmos, the behavior of the individual is singularly altered; thoughts and emotions succeed each other with irrelevant sequence and rapidity; motility also is quickened, so that those about him are unable to divine what may be the next move of the patient. Objectively, there is something wrong. Subjectively, the patient may still feel normal, or perhaps physically and mentally exhilarated. More often, however, the patient is cognizant of weakness, especially in the lower limbs, a constant moisture of the skin, loss in weight in spite of a good appetite, a feeling of trembling all over the body, and nervousness. The neck garments may or may not become tight, tho the remainder of the body is becoming emaciated.

Sooner or later, the exophthalmos becomes subjective, for, on glancing in the mirror, there is the sudden discovery that the eyes are bulging. The patient may at this time appear in the doctor's office with exophthalmos as the only complaint; or, the proptosis may have been discovered by the physician prior to this time, if the patient had already appeared before him complaining of other symptoms. Exophthalmos may occur later in the disease, i. e., when the syndrome is fairly well advanced. It is in this class of patients, especially when there is an absence of thyroid enlargement, that the diagnosis is frequently belated, and the necessary treatment is attempted only after serious damage has occurred to the vital organs.

Degrees of Exophthalmos. — In these observations, the exophthalmometer was not employed. Tho this instrument is useful in estimating changes occurring in the course of a very evident exophthalmos, it is not a reliable guide as indicator of the presence or absence of proptosis of less evident degree. In many instances, it fails to indicate exophthalmos when the patient's relatives and medical attendant are convinced of its presence. Accordingly the usual inspectional method was employed, and the terms "slight," "moderate," "marked," and "extreme," were used to indicate the degree of exophthalmos observed.

Exophthalmos is the most dramatic expression of Graves' disease. It is accentuated by conversation, active attention, physical and mental excitation, menstruation, pregnancy, and fatigue. The 400 cases herein reported were studied during the years 1918 to 1921 inclusive. Incidentally, in some of these patients, certain conditions peculiar to the World War bore a direct or indirect etiologic relationship to the syndrome.

EXOPHTHALMOS AND AGE OF PATIENT.

Age of Patients—	Under 10 years	10 to 15 years	15 to 20 years	20 to 30 years	30 to 40 years	40 to 50 years	50 to 60 years	60 to 70 years	70 to 75 years	Total
No exophthalmos	1	3	10	11	5	6	2	1	..	39 (9¾%)
Exophthalmos on attention only	1	2	12	12	10	7	2	..	..	46(11½%)
Slight exophthalmos	..	3	13	26	12	6	1	1	..	62(15½%)
Moderate exophthalmos	3	12	18	34	7	9	4	4	1	92 (23%)
Marked exophthalmos	..	5	15	30	10	7	6	2	2	77(19¼%)
Extreme exophthalmos	..	2	2	16	3	2	2	1	..	28 (7%)
Unequal exophthalmos (greater in right eye)	..	3	2	3	3	1	1	..	..	13 (3¼%)
Unequal exophthalmos (greater in left eye)	..	2	2	5	2	..	1	..	..	12 (3%)
Unilateral exophthalmos (right eye only)	..	4	4	4	1	3	..	1	..	17 (4¼%)
Unilateral exophthalmos (left eye only)	..	2	2	6	1	1	1	..	1	14 (3½%)
Total number of patients	5	38	80	147	54	42	20	10	4	400

Exophthalmos may not be severe enough to occasion serious damage to the ocular mechanism. In most instances, the conjunctiva is somewhat congested, occasioning little or no discomfort to the patient. Vision, too, is uninfluenced. In instances where the eyes bulge markedly, tho the eyelids may still be able to close over the eyeball, this is accomplished with difficulty. Such patients commonly experience a burning sensation of the eyeballs, early fatigue of vision, excessive dryness or excessive moisture of the conjunctiva, and a varying grade of chronic conjunctivitis.

In a small percentage of patients, the exophthalmos is extreme, reaching the point at which the eyelids are incapable of coaptation, so that the patient cannot close the eyelids on retiring. It is then that serious trouble may begin, for the eyeball cannot long withstand the absence of the protection offered them by the lids. In some cases, a mere thirty-second of an inch is lacking to form complete coaptation, while in others, the eyes remain permanently open night and day, the lids being incapable of closing to within half an inch or more. This frequently leads to corneal ulcers and opacities, with varying degrees of impairment of vision. In a few of my patients, the habit of placing a small pad of gauze or flannel over each eye before retiring served as a protection against irritation during sleep.

Unprotected eyeballs are indeed a causal factor in the insomnia common to patients with Graves' disease. In an instance brought to my attention, the patient's exophthalmos was aggravated to the point of ocular dislocation by the administration on the part of an inexperienced attendant of thyroid extract gr. v, t. i. d. Unilateral, then bilateral ophthalmitis developed, the subsequent panophthalmitis becoming so severe as to require a double eyeball enucleation in order to save the patient's life.

Ordinarily, the moderate or marked exophthalmos in these patients remains a more or less constant factor with little variation in degree, until the syndrome is terminated. In a not inconsiderable percentage of patients, the course of the disease is lengthened in duration to eight, ten, or more years, often with a reduction in its severity. In such instances, the exophthalmos, if marked or extreme, in course of time becomes less severe, with usually an accompanying edema of the upper and lower lids. This edema may be local, due to chronic congestion of the orbital tissues, or it may be an evidence of circulatory decompensation. Occasionally, the edema is due to both the local and general causes.

EXOPHTHALMOS AND OTHER EYE SIGNS.—That the Dalrymple, von Graefe, Stellwag, Moebius, and other eye signs are dependent upon the existence of exophthalmos, is believed by Claiborne and others. In this series of cases there is an apparent confirmation of this view, for in nearly all instances of unmistakable exophthalmos the usual eye signs were present in varying degree. An apparent contradiction, however, seems to present itself when we observe a von Graefe in some

DEGREES OF EXOPHTHALMOS COMMONLY SEEN IN EXOPHTHALMIC GOITER.

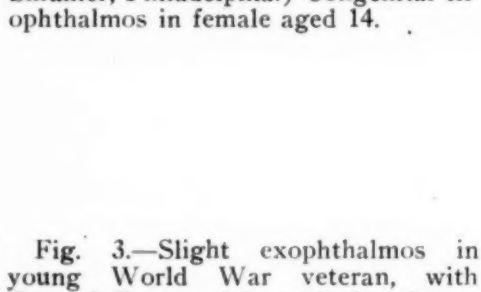

Fig. 1.—(Referred by Dr. M. E. Smukler, Philadelphia.) Congenital exophthalmos in female aged 14.

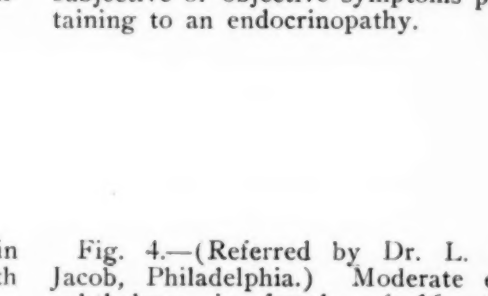

Fig. 2.—Same patient as Fig. 1. No subjective or objective symptoms pertaining to an endocrinopathy.

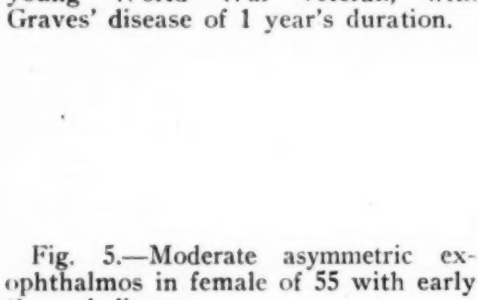

Fig. 3.—Slight exophthalmos in young World War veteran, with Graves' disease of 1 year's duration.

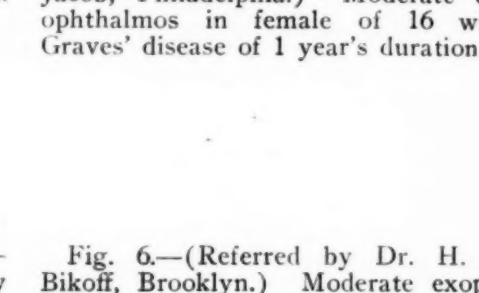

Fig. 4.—(Referred by Dr. L. H. Jacob, Philadelphia.) Moderate exophthalmos in female of 16 with Graves' disease of 1 year's duration.

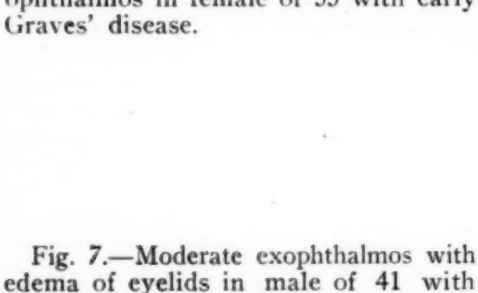

Fig. 5.—Moderate asymmetric exophthalmos in female of 55 with early Graves' disease.

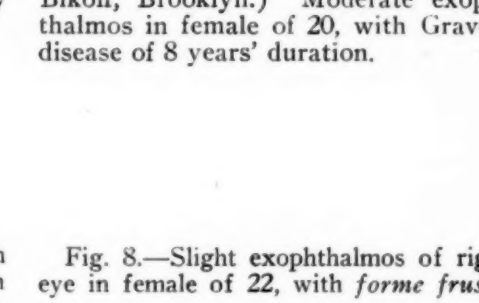

Fig. 6.—(Referred by Dr. H. S. Bikoff, Brooklyn.) Moderate exophthalmos in female of 20, with Graves' disease of 8 years' duration.

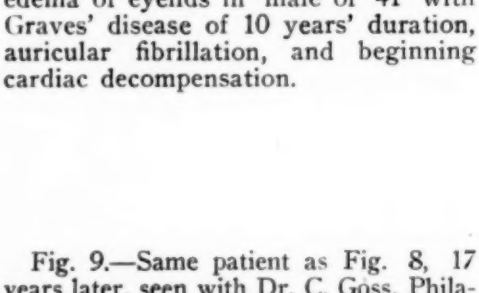

Fig. 7.—Moderate exophthalmos with edema of eyelids in male of 41 with Graves' disease of 10 years' duration, auricular fibrillation, and beginning cardiac decompensation.

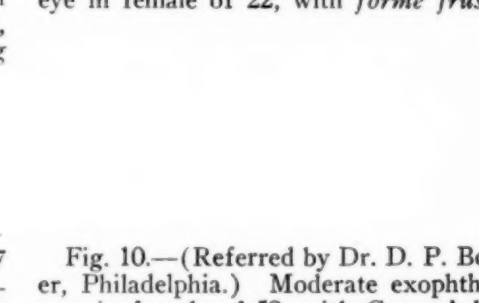

Fig. 8.—Slight exophthalmos of right eye in female of 22, with *forme fruste*.

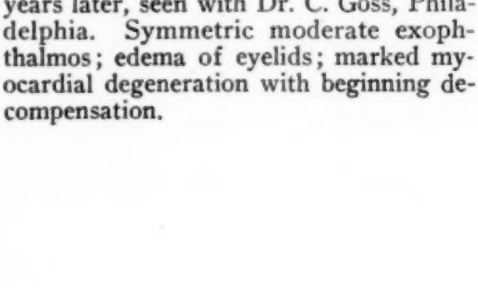

Fig. 9.—Same patient as Fig. 8, 17 years later, seen with Dr. C. Goss, Philadelphia. Symmetric moderate exophthalmos; edema of eyelids; marked myocardial degeneration with beginning decompensation.

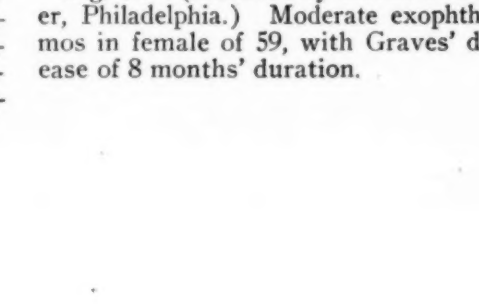

Fig. 10.—(Referred by Dr. D. P. Boyer, Philadelphia.) Moderate exophthalmos in female of 59, with Graves' disease of 8 months' duration.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

DEGREES OF EXOPHTHALMOS COMMONLY SEEN IN EXOPHTHALMIC GOITER.
(Continued)

Fig. 11.—(Referred by Dr. A. L. Schaller, Philadelphia.) Moderate exophthalmos in female of 21, with Graves' disease of 1 year's duration.

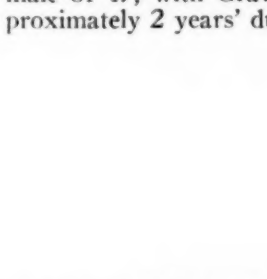

Fig. 12.—(Kind permission of Dr. Hobart A. Hare, Jefferson Medical College.) Moderate exophthalmos in female of 17, with Graves' disease of approximately 2 years' duration.

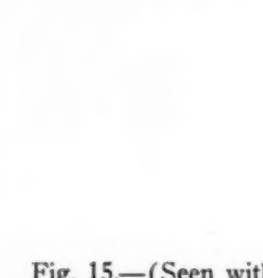

Fig. 13.—(Referred by Dr. C. A. Young, Philadelphia.) Moderate exophthalmos in female of 25 with Graves' disease of 7 years' duration.

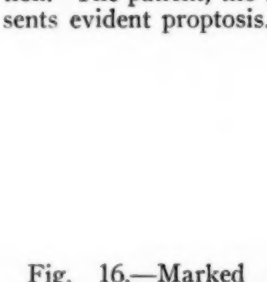

Fig. 14.—(Referred by Dr. Edith M. C. Weber, Philadelphia.) Moderate exophthalmos in female of 27 with Graves' disease of approximately 3 years' duration. The patient, tho laughing, still presents evident proptosis.

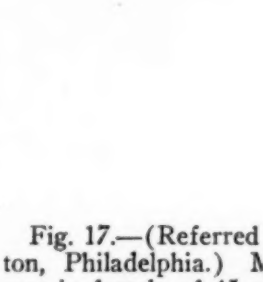

Fig. 15.—(Seen with Dr. M. Korshet, Passaic, N. J.) Marked exophthalmos in female of 38, with Graves' disease of 10 years' duration. Note edema of eyelids.

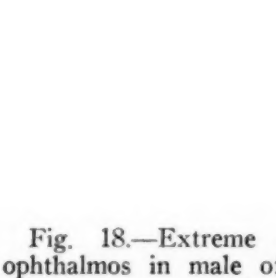

Fig. 16.—Marked exophthalmos in male of 27 with Graves' disease of 3 years' duration. Slight edema of eyelids.

Fig. 17.—(Referred by Dr. J. J. Stanton, Philadelphia.) Marked exophthalmos in female of 45 years, with Graves' disease of 3 years' duration. Moderate edema of eyelids.

Fig. 18.—Extreme asymmetric exophthalmos in male of 28 years with Graves' disease of 9 months' duration. Edema of eyelids.

Fig. 11

Fig. 12

Fig. 13

Fig. 14

Fig. 15

Fig. 16

Fig. 17

Fig. 18

patients in whom exophthalmos is absent.

EXOPHTHALMOS AND GOITER INCIDENCE.—The tendency toward goiter formation seems greater in patients with exophthalmos than in those without; perhaps the reverse may also be stated, i. e., the tendency to exophthalmos is greater in those with thyroid swelling than in those whose thyroid is normal in size.

RELATIONSHIP OF EXOPHTHALMOS TO GOITER IN GRAVES' DISEASE:

	No Exophthalmos Present	Exophthalmos Present	Total
No thyroid enlargement	22 (5.5%)	56 (14%)	78 (19.5%)
Slight thyroid enlargement	4 (1%)	84 (21%)	88 (22%)
Moderate thyroid enlargement	8 (2%)	103 (25.75%)	111 (27.75%)
Marked thyroid enlargement	5 (1.25%)	98 (24.5%)	103 (25.75%)
Extreme thyroid enlargement		20 (5%)	20 (5%)
Totals	39 (9.75%)	361 (90.25%)	400 (100%)

There seems to be no relationship between unilateral or asymmetric exophthalmos and unilateral thyroid enlargement. A right sided exophthalmos, or a right sided accentuation of exophthalmos, may exist just as often with a symmetric thyroid enlargement as with an enlargement of the right or of the left lobe only of the organ. In other words, the symmetry or asymmetry of the exophthalmos seems to bear no relation to the symmetry or asymmetry of the thyroid enlargement.

EXOPHTHALMOS AND SEVERITY OF THE DISEASE.—The degree of exophthalmos bears no definite relation to the severity of the syndrome of the disease. While we often observe a more severe course of the disease in patients with marked exophthalmos than in those with little or no bulging of the eyes, exceptions to this are so often seen, that one should hesitate to state percentages or suggest rules in this regard. Very severe instances of the disease with auricular fibrillation and with cardiac decompensation are often seen in patients who never, at any time, present either exophthalmos or goiter. In fact, so often is this observed, that one is tempted to call this class of patient a definite type of the disease. The basal metabolism may frequently appear much higher in a patient with slight or no exophthalmos than in one whose eyes seem to pop out of their orbits. In general, it may be said that a patient with slight or moderate exophthalmos and thyroid swelling is usually a subject of Graves' disease of average severity. Exceptions *pro* and *con* are numerous.

EXOPHTHALMOS AND AGE OF PATIENT.—No relationship seems to exist between the age of the patient and the probable development of exophthalmos during the course of Graves' disease.

With regard to the degree of exophthalmos, it might be said that in very young subjects of Graves' disease, (under 10 years of age), there is apt to be slight or moderate exophthalmos. As we approach puberty, adolescence, and go on to patients in early adult life, bulging of the eyes becomes more prominent. Past the age of 40, the tendency towards moderation of exophthalmos becomes manifest.

EXOPHTHALMOS AND SEX.—The sex incidence in this series of cases differs somewhat from statistics of other observers. Of the 400 cases, 136 or 34 percent occurred in males. Of the 39 patients without exophthalmos, 18 were males,—13.2 percent of the total number of male patients, and 21 were females,—7.9 percent of the total number of female patients. This would indicate that during the course of Graves' disease, females are more apt to develop exophthalmos than males.

EXOPHTHALMOS AND THYROID ADENOMA.—Toxic adenoma is to be differentiated from exophthalmic goiter by the absence in the former of exophthalmos* and other eye signs characterizing the latter. There are many

*Tho exophthalmos is absent in toxic adenoma, one may frequently observe a stare in these patients, without the von Graefe and other eye signs commonly seen in Graves' disease. This is not due to the hyperthyroidism, but to the impaired circulation to the head and eyes from pressure upon the cervical blood vessels by the adenoma, if the tumor be large. Staring eyes may also be observed without thyrotoxemia in instances of pressure due to intrathoracic goiters, giving rise to the socalled "mechanical goiter heart," in which dyspnea is a distressing feature.

other clinical differences between toxic adenoma and exophthalmic goiter which might be mentioned were this paper dealing with diagnosis. We must bear this important fact in mind: A person with a simple or nontoxic goiter may develop exophthalmic goiter with or without exophthalmos quite as readily as any one else. Presented with a patient who reveals all the signs and symptoms of Graves' disease, but in whom there is an adenoma over the thyroid, we must not conclude that we are dealing with a case of toxic adenoma with exophthalmos. This patient, on final analysis, may be suffering with a hyperplasia of the formerly normal thyroid tissue behind the adenoma, associated with the generalized neuroendocrin dysfunction characterizing Graves' disease. In such an event, the presence of the adenoma is merely coincidental and plays no part in the etiology of the syndrome. It must be stated that, in the absence of exophthalmos and the presence of a coincidental adenoma, the differentiation between toxic adenoma and Grave's disease is rather difficult.

EXOPHTHALMOS IN LAUGHTER.—Tho the picture of chronic fright is typical of the facies of patients with exophthalmic goiter, it is not difficult to make them laugh. In fact, in these ultraemotional patients, the alternation of frowns and moroseness with laughter occurs frequently with little or no substantial cause. Now, in a normal individual during laughter, the muscles about the eyes contract in such manner as to cause the lids partly to close over the eyeballs; in many persons this occurs to such degree that the eyes are almost closed. Such is not the case in patients with marked exophthalmos,—the eyes still stare almost as much as ever during laughter, rendering the individual's expression an odd combination of mirth attempting to temper the expression of fear.

RÔLE OF OPHTHALMOLOGIST IN GRAVES' DISEASE.—In view of the part played by the eyes in the greater percentage of cases of exophthalmic goiter, it can readily be seen that the cooperation of the ophthalmologist is not only desirable, but often vital, in the management of a subject of Graves' disease. The maintenance of a healthy conjunctiva, the prevention of corneal ulcers and opacities, the correction of refractive errors with its conservation of nervous energy, the occasional examination of the fundus to detect any changes suggesting circulatory and renal complications or an intercurrent diabetes,—this is the important rôle of the oculist whose services should always be considered as a necessary constituent in the rational outline of the treatment of these patients.

RESULTS OF TREATMENT. — When, thru successful therapeusis, amelioration of symptoms begins, the following is the usual sequence of improvement: The heart rate is diminished, palpitation disappears, nervousness is reduced, sleep is improved, weight is increased, and there is a beginning general sense of well being. The thyroid swelling, if present, may at first slightly decrease in size, but usually does not shrink until some time after improvement occurs elsewhere, and depending upon the chronicity of the affection, may not become normal for months following the disappearance of cardiac, nervous, and nutritional signs and symptoms. The same may be said of exophthalmos. The protrusion of the eyeballs is reduced markedly during the satisfactory course of therapeutic events to such a point that the expression of fright no longer exists; but for pathologic reasons within the orbit itself, complete disappearance of exophthalmos may not occur for several months or a year or more following the disappearance of all other active manifestations of Graves' disease. This does not mean that the patient has not recovered; it merely indicates that the process of absorption of a pathologic redundancy of retroorbital fat, blood vessels, and other factors, real or hypothetic, is a very slow procedure. The facility with which this process occurs depends in large measure upon the previous duration or chronicity of the affection. In a patient cured of a Graves' disease of one

RESULTS OF TREATMENT.

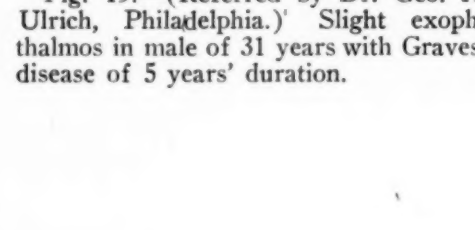

Fig. 19.—(Referred by Dr. Geo. A. Ulrich, Philadelphia.) Slight exophthalmos in male of 31 years with Graves' disease of 5 years' duration.

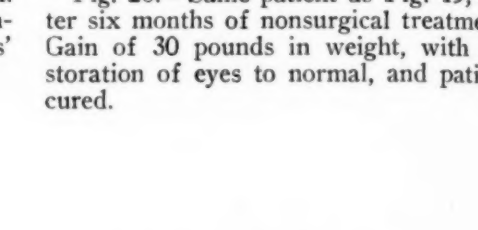

Fig. 20.—Same patient as Fig. 19, after six months of nonsurgical treatment. Gain of 30 pounds in weight, with restoration of eyes to normal, and patient cured.

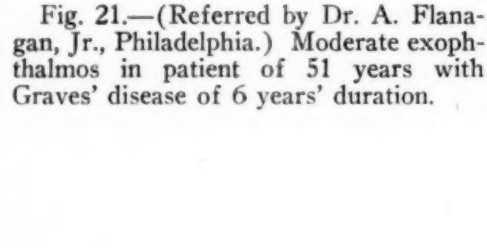

Fig. 21.—(Referred by Dr. A. Flanagan, Jr., Philadelphia.) Moderate exophthalmos in patient of 51 years with Graves' disease of 6 years' duration.

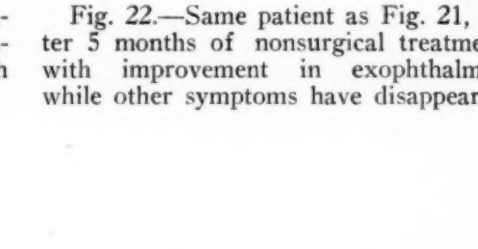

Fig. 22.—Same patient as Fig. 21, after 5 months of nonsurgical treatment, with improvement in exophthalmos, while other symptoms have disappeared.

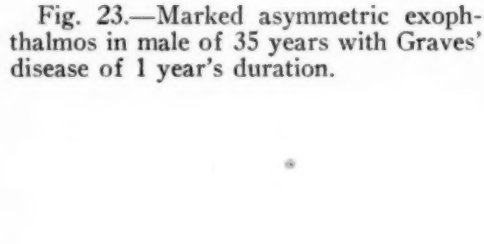

Fig. 23.—Marked asymmetric exophthalmos in male of 35 years with Graves' disease of 1 year's duration.

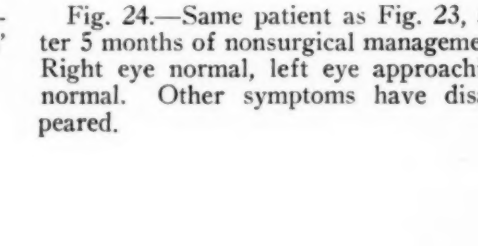

Fig. 24.—Same patient as Fig. 23, after 5 months of nonsurgical management. Right eye normal, left eye approaching normal. Other symptoms have disappeared.

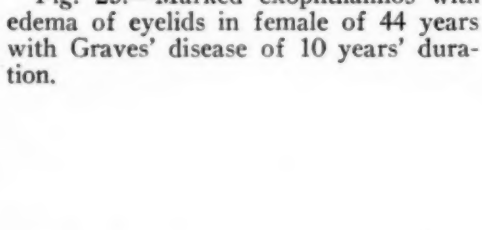

Fig. 25.—Marked exophthalmos with edema of eyelids in female of 44 years with Graves' disease of 10 years' duration.

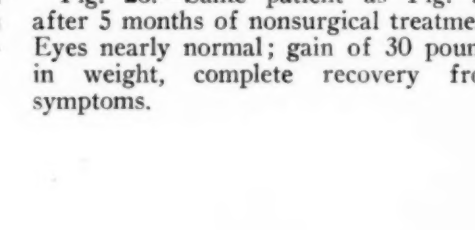

Fig. 26.—Same patient as Fig. 25, after 5 months of nonsurgical treatment. Eyes nearly normal; gain of 30 pounds in weight, complete recovery from symptoms.

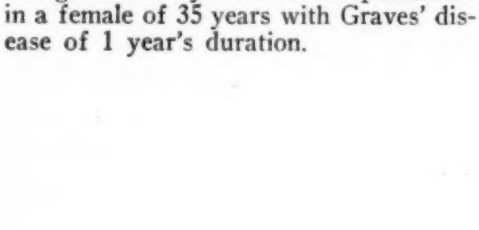

Fig. 27.—Asymmetric exophthalmos in a female of 35 years with Graves' disease of 1 year's duration.

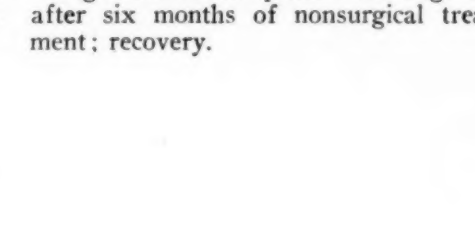

Fig. 28.—Same patient as Fig. 27, after six months of nonsurgical treatment; recovery.

Fig. 19

Fig. 20

Fig. 21

Fig. 22

Fig. 23

Fig. 24

Fig. 25

Fig. 26

Fig. 27

Fig. 28

Fig. 29.—Moderate exophthalmos in female of 28 years with Graves' disease of 10 years' duration.

Fig. 30.—Same patient as Fig. 29, after 7 months of nonsurgical treatment. Complete recovery.

Fig. 31.—Marked exophthalmos in male of 32 years with Graves' disease of 3 years' duration. There is auricular fibrillation with beginning decompensation.

Fig. 32.—Same patient as Fig. 31, after 6 months of nonsurgical treatment. Eyes and symptoms nearly normal. Gain of 30 pounds in weight.

Fig. 33.—Moderate exophthalmos in male of 59 years with Graves' disease of 3 years' duration. Marked cardiac arrhythmia.

Fig. 34.—Same patient as Fig. 33, after 6 weeks of nonsurgical treatment. Eyes normal; gain of 15 pounds in weight; marked amelioration of symptoms.

Fig. 35.—Extreme asymmetric exophthalmos in female of 74 with Graves' disease of 4 years' duration.

Fig. 36.—Same patient as Fig. 25, after 12 months of nonsurgical management. Eyes nearly normal; there is a gain of 30 pounds in weight; other other symptoms have disappeared.

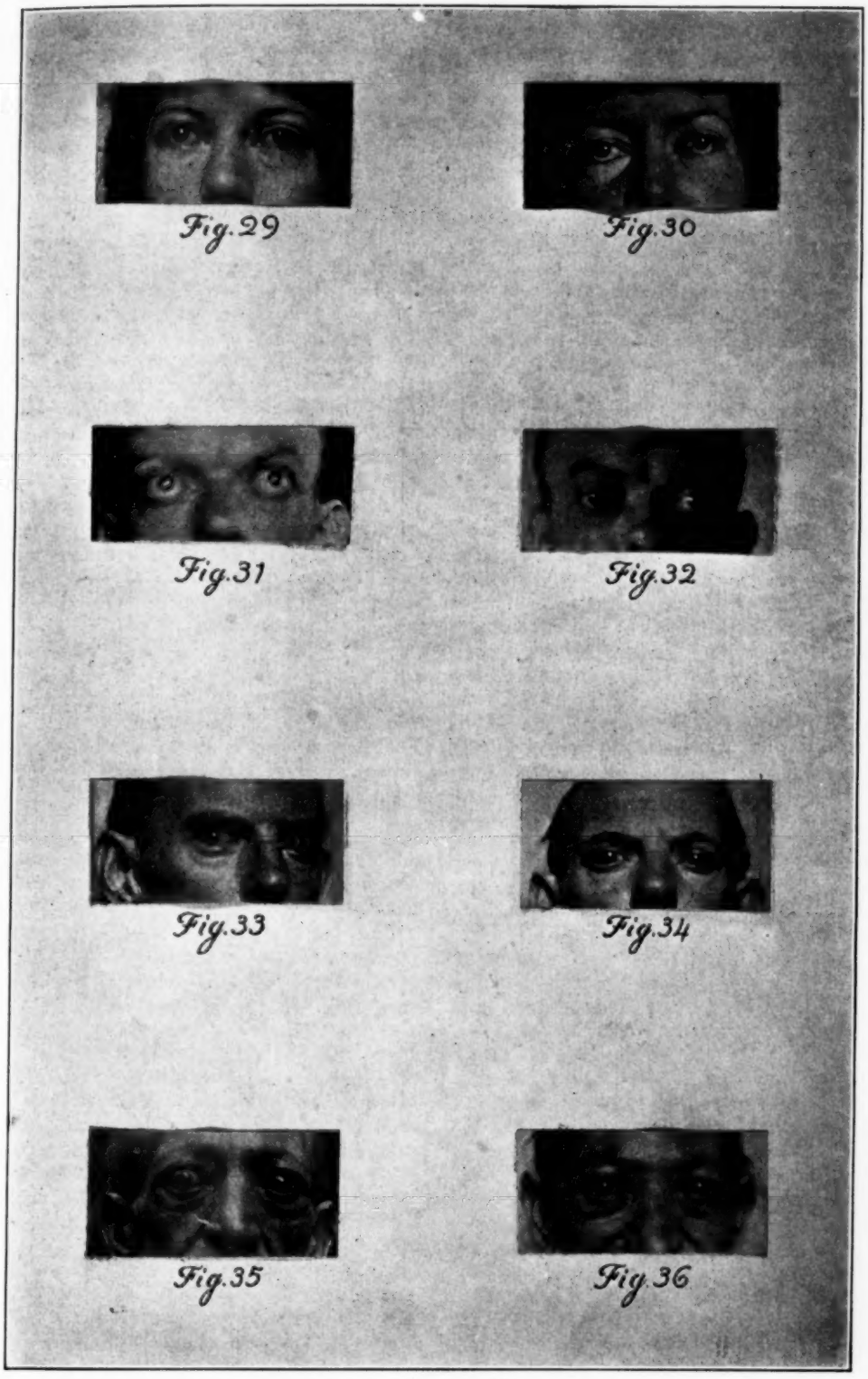

Fig. 29

Fig. 30

Fig. 31

Fig. 32

Fig. 33

Fig. 34

Fig. 35

Fig. 36

year's duration, the exophthalmos may disappear within six months to a year following the institution of treatment. In one having suffered with Graves' disease for ten or more years, the eyes may not resume their former appearance for two or three years following recovery from the disease. Sooner or later, however, the exophthalmos disappears, and the eyes are restored to their normal appearance.

CONCLUSIONS:—In this series of 400 cases of Graves' disease reported, the following deductions may be drawn with respect to exophthalmos:

1. Exophthalmos (and goiter) are not essential to diagnosis.

2. Exophthalmos rarely if ever precedes, occasionally occurs simultaneously with, but usually follows the appearance of other characteristic manifestations of the disease.

3. Tho in the average patient vision is usually unimpaired, exophthalmos, if extreme, may lead to partial or complete blindness thru corneal ulcers and opacities, and occasionally may even endanger life thru panophthalmitis.

4. Exophthalmos is probably the basis upon which all other eye signs commonly observed in Graves' disease depend.

5. Patients without goiter are less apt to present exophthalmos than those with a degree of thyroid enlargement; the corollary to this is also evident, i. e., patients without exophthalmos are less apt to develop thyroid swelling than those already presenting proptosis.

6. While marked and extreme exophthalmos are commonly seen as a constituent of a very severe picture of Graves' disease, the reverse is so often the case that no definite general relation could be stated to exist between the degree of exophthalmos and the severity of the clinical syndrome.

7. Tho usually symmetrically bilateral, exophthalmos is often asymmetrically bilateral, and occasionally primarily or persistently unilateral. The symmetry or asymmetry of exophthalmos bears no relation to the symmetry or asymmetry of thyroid enlargement.

8. Exophthalmos in Graves' disease occurs somewhat more frequently in females than in males.

9. The services of an ophthalmologist are often a necessary part of the broad management of the disease.

10. Exophthalmos, during the process of recovery, is usually the last sign of the disease to disappear.

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AGRICULTURAL CONJUNCTIVITIS.

JAMES M. PATTON, M.D., and SANFORD R. GIFFORD, M.D.

OMAHA, NEBRASKA.

The six cases here reported are sufficiently alike to constitute a clinical group. All the patients were adult or adolescent males engaged in out door occupations, which suggested the name proposed. Bacteriologic investigations showed mixed infection in all. A large gram positive anaerobic bacillus found in 5 of them is possibly an etiologic factor. They were characterized by enormous swelling of the lids, swelling of the adjoining lymph nodes, superficial necrosis of the skin of the lids and pseudomembranous deposit on the conjunctiva. The cases were studied in the Department of Ophthalmology, University of Nebraska, College of Medicine. The paper was presented to the Section on Ophthalmology of the American Medical Association, June, 1921, and is published here thru the courtesy of the Journal of the A. M. A.

During the last year, we have seen six cases of a type of conjunctivitis, unique in our experience, which presented enough clinical features in common to justify their presentation in a group, with the idea of determining whether or not they form a distinct clinical entity.

REPORT OF CASES

CASE 1.—*History.*—W. G., a farmer, aged 17, first seen May 23, 1920. About five days before, he had noticed a swelling of the cervical glands on the right side. The swelling seemed to extend upward, and a day or two later, the right eyelids began to swell rapidly. The pain was not marked, but considerable discharge was present.

Examination.—Both lids of the right eye, especially the upper were swollen to such an extent that they could be opened only a few millimeters. They were deeply congested, hard and hot. The preauricular and cervical glands were markedly enlarged and tender. The skin of the lower lid showed several grayish areas, 6 to 10 mm. in diameter, which resembled small flat pustules. On opening one of these, only a whitish caseous material was found. There was a similar area on the skin about each canthus, which remained excoriated and bleeding for some days, and the skin of the lid border was covered with a closely adherent membrane. The palpebral conjunctiva, where it could be seen, was covered with a similar thick membrane. The bulbar conjunctiva was thickened and congested but showed no membrane. The temperature on admission was 101.4 F., 99.8 the following day, and on subsequent days reached 99 almost every day, until a few days before dismissal. In spite of this, the leucocyte count was only 8,000.

Clinical Course.—Under frequent hot applications and instillations of argyrol, the swelling of the lids and glands gradually subsided. The membrane slowly disappeared and the pustules, after the superficial layers had sloughed off, healed up, leaving slight scarring. Zinc oxid was kept constantly applied to the skin of the lids under a loose dressing. One week after admission, a small erosion appeared near the center of the right cornea which persisted for same days, in spite of cauterization with trichloracetic acid, until the area was curetted, when it healed up rather promptly.

He was dismissed after twenty days, with the right cornea showing a slight leucoma and considerable conjunctival thickening, but no membrane. A letter from his family physician, Dr. Cole, some months later, reports some thickening of the lids, slight congestion and excellent vision.

CASE 2.—*History.*—M. L., a farmer, aged 31, seen Sept. 16, 1920. About a week before, while working in the fields, he thought a piece of chaff had blown into his eye. His family physician had removed this, and the eye had felt fairly comfortable until about two days before he came in, when the lids of the right eye had begun to swell markedly.

Examination.—There was a hard, brawny swelling of the lids of the right eye. The lids could be separated with difficulty, scarcely sufficiently to

allow one to see the cornea. The preauricular and superior cervical lymph nodes were enlarged, so that the whole side of his face appeared swollen. The palpebral and bulbar conjunctiva were covered, as far as could be seen, with grayish exudate. A few small pieces of this were removed for examination. They were firmly adherent, leaving a slightly bleeding surface on removal. No foreign body was found, and as far as could be seen, the cornea was normal. A few small areas like those in Case 1, but not so extensive, were seen about the internal angle,

Fig. 1 (Case 3).—Appearance of eye at the time of examination.

on both lids and on the cheek below the eye. The temperature on admission was 99.4 F., and continued between 99 and 100 for about three days.

Treatment and Results.—The smears showed organisms resembling pneumococcus. In addition to instillations of zinc collyrium and 10 per cent. argyrol, 5 per cent. ethylhydrocuprein (optochin) was instilled four times a day, with frequent applications of heat and zinc oxid to the skin lesions. On the third day, one injection of 50 c.c. of polyvalent antipneumococcus serum was given intravenously. The swelling of the lids and the glands slowly subsided, so that the eye could be opened, and the membrane gradually became detached. About the tenth day, a small erosion developed on the lower inner quadrant of the cornea, which healed under atropin and heat in two or three days. When he was sent home, September 30, there was still considerable thickening of the conjunctiva but no membrane, and a localized corneal haziness which reduced his vision to 20/70.

Case 3.—*History.*—F. H., a farmer, aged 49, a neighbor of the patient in Case 2, seen Oct. 18, 1920. Two weeks before, while haying, he got some dust in his right eye. The eye was slightly red, and after a week, his home physician removed a small foreign body from his eye. After a day or so, he noticed a swelling of his lids, and for three days before coming in, he had been unable to open them.

Examination.—There was an enormous hard, brawny swelling of both lids of the right eye. The cornea was indistinctly seen but apparently intact. The preauricular and submaxillary glands were enlarged and hard. There was a small pustule, one-half inch below the center of the lower lid border. The lids could be opened slightly, enough to allow one to see that both lids were covered with a thick membrane coming up close to the cornea and extending out from the lid borders (Fig. 1). Small portions of the membrane were removed, but no attempt was made to find a foreign body.

Treatment and Results.—The patient was put on boracic irrigations every two hours, 5 per cent. optochin every two hours, and thirty grains of sodium salicylat, three times a day. For the first few days, the brawny swelling became even harder, so that the lids could not be opened at all. After a week, they could be opened slightly, so that the membrane was seen to extend to the limbus and slightly overlap the cornea all around. After ten days, a superficial ulceration appeared on the cornea, which eventually included most of the upper half. The patient's temperature was 99.6 F. on admission, 101.2 during the second day, and reached 100 on the four succeeding days, after which it dropped to 99 for two days and then to normal.

For personal reasons, he was obliged to go home on the thirteenth day with the swelling mostly gone, but with marked adhesions of the upper folds,

a haze involving the upper half of the cornea and vision of hand movements at one foot. Dr. Malster, five months later, states that there is still considerable thickening of the lids and some ptosis; the conjunctiva is inflamed, with a tendency in certain parts to be granular. He also reports that the cornea is quite cloudy, the pupil is not easily outlined and there is a pseudopterygium on the inner side, running to the edge of the iris and quite congested. Also the rest of the eyeball is still quite red. Vision is hand movements.

On March 24, 1921, he returned, when the condition shown in Figure 2 was seen. There were adhesions of the lids to the globe both above and below, with a thick vascular tissue covering about three-fourths of the cornea, leaving a clear area up and out, however, thru which 3/200 vision could be obtained.

CASE 4.—*History.*—W. M., aged 11, a farmer's son, was referred Oct. 31, 1920. The week before, he had noticed that the right eye was a little inflamed. It remained so for two or three days, when the lids began to swell rapidly. He gave no history of trauma.

Examination.—When first seen, the skin and subcutaneous tissue of the entire upper lid was necrotic and covered with a grayish exudate, with crusting over the central portion. There were several discrete flat yellowish pustules on the side of the nose below the lower lid, and on the brow above the upper lid, from 7 to 8 mm. in diameter. There was marked swelling and redness of the tissues from the ear to the external angle, extending down nearly to the angle of the jaw (Fig. 3). No attempt was made to separate the lids, but the patient was unable to open them even slightly. His temperature was 101.2 F. on admission, reached 100 and 99.4 on two successive days, and then dropped to normal.

Treatment and Results.—He was given frequent applications of moist heat, and a moist lead lotion dressing was kept constantly applied. When his eye could be opened, he was given instillations of weak zinc collyrium and yellow mercuric oxid ointment. About the tenth day, a small superficial corneal erosion appeared on the cornea of the other eye, with only moderate congestion of the conjunctiva and no secretion or involvement of the lids. This cleared promptly on local applications. While he was under treatment, several new pustules developed on the lower lid which healed without any scarring. On dismissal, the area of superficial necrosis over the upper lid had begun to heal in considerably at the edges,

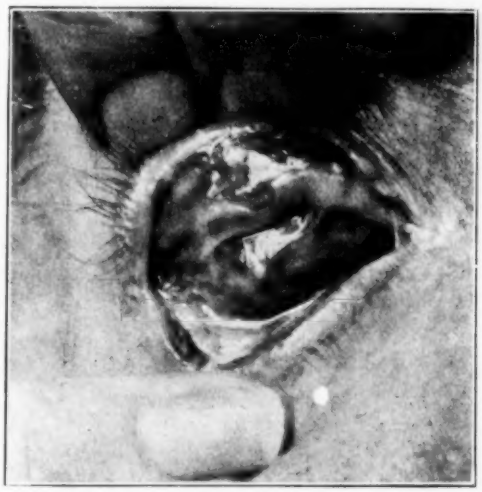

Fig. 2 (Case 3).—Appearance of eye after four months.

and clean granulations covered the ulcerated portion. His vision was 20/20 with correction in each eye. No membrane was ever observed, but during the first week, it was impossible to get a view of the conjunctival surface.

CASE 5.—*History.*—W. D., aged 16, first seen Dec. 26, 1920. A few days before he first noticed the symptoms, he had been employed in clearing up a patch of dry weeds near his home. For the last week, his right eye had been inflamed, and for three days he had been under treatment by another oculist, who had given him argyrol instillations.

Examination.—When first seen, both lids were somewhat swollen but could be opened. The palpebral conjunctiva was markedly thickened. The ocular conjunctiva was chemotic, and the eye

could be moved only a few millimeters in any direction. The preauricular and submaxillary glands were palpable but not tender. The temperature was normal, but he stated that he had had chills and fever several times during the sac, but no pustules on the lids or evidence of membrane (Fig. 4).

Treatment and Results.—Under frequent applications of moist heat, weak zinc and boracic instillations and atropin, the swelling of the lids de-

Fig. 3 (Case 4).—Appearance of eye at the time of examination.

the last few days. He was told to continue treatment with the addition of frequent applications of moist heat. He did not report the next day as directed, but on the third day presented himself with a swelling of the lids so extreme, that they could be opened only slightly. The upper lid was hard and hot. The preauricular and submaxillary glands were much more swollen and tender. There was a moderate amount of mucopurulent discharge in creased rather promptly, so that in a week he was able to open his eye about one-third of the normal extent. After this, there was still considerable swelling at the outer angle of the lid, and the conjunctiva remained congested and showed a peculiar follicular hypertrophy near the outer angle, which was still apparent two months later, tho the ocular conjunctiva was normal and the eye was perfectly comfortable. The cornea was never involved, and his

vision remained 20/15. The temperature during the first three days at the hospital was 99 F., after which it dropped to normal.

CASE 6.—*History.*—D. R., aged 9, the son of a farmer, was referred to us, Jan. 12, 1921. While playing with other children, he had scratched the skin of the right upper lid with a weed. After three or four days, the lid began to become red and the redness increased for two weeks. It began to swell rapidly two days before coming in.

Fig. 4 (Case 5).—Appearance of eye at time of examination.

Examination.—There was very marked brawny swelling of the upper lid, which hung down over the lower. The skin was tense and red with a moderate purulent discharge from the sac. The preauricular glands were moderately enlarged but not particularly tender. Extending from above the inner canthus down to and including the lower lid, there were several small flat discrete lesions such as have been described in the other cases (Fig. 5). There was no attempt made to separate the lids, but a characteristic membrane protruded below the lid margin.

Treatment and Results.—This consisted of heat and irrigations. The swelling reacted promptly to treatment, so that after the fourth day, we were able to get a fairly good view of the lower portion of the cornea. Two days later, the lids had opened sufficiently, so that all of the cornea could be seen and was perfectly clear. The next day, however, on examining the cornea, the lower one-third was found to be decidedly hazy, due, evidently, to improper coaptation of the lids. This cleared up on keeping the cornea thoroly protected with petrolatum.

The symptoms rapidly sudsided and he was discharged on the fifteenth day, but returned a week later for examination, at which time, in spite of considerable thickening of the conjunctiva and photophobia, he had vision of at least 20/50. His temperature on admission was 100 F. and ranged up to 99 for ten days. A report from Dr. Zimmerman six weeks later stated that there was still a slight thickening of the upper lids, the conjunctiva was very slightly injected, and vision was practically normal. The doctor reported that he has known of no diphtheria, or of any cases suspected of being such, in the surrounding country for the last two or three years.

CLINICAL SUMMARY

These cases, with the exception of Case 5, which was seen very early, and possibly Case 4, in which we were unable to turn the lids until the healing process was well advanced, presented very pronounced swelling and redness of the lids, involvement of the regional lymph nodes, the presence of more or less extensive skin lesions, and a dense and decidedly adherent false membrane involving both the palpebral and bulbar conjunctiva. There was a varying degree of superficial keratitis, which in no case went on to perforation, altho in Case 3 there was a very dense vascular scar involving nearly all of the cornea. All ran a temperature of from 99.5 to 101 F. at the start, dropping in a few days to normal. In all, the serious condition was monocular, tho one patient (Case 4) showed catarrhal conjunctivitis of the other eye. Our cases were all in males, ranging from 9 to 49 years of age, who were all engaged in some form of rural pursuit. Three patients gave a history of some slight trauma-

tism. It is interesting to note that four of our six patents were from the same general locality, and two of the patients reported by correspondence were from one other locality.

All cases yielded to heat and frequent instillations of mild collyria, and, except as mentioned before, healed with very little impairment of vision.

Fig. 5. (Case 6.) Appearance of eye at time of examination.

No antitoxin was given, as we were unable in any case to find evidence of B. diphtheriae, nor were we able to get a history of any exposure to this disease.

Since we had seen no similar cases reported from other districts, a questionnaire was sent to about three hundred general practitioners and oculists in the northern Missouri valley. Of sixty-four who replied, forty-six had seen no similar cases. Several of the remaining eighteen who reported cases did not give symptoms in sufficient detail to enable us to form an exact idea as to the nature of the condition. A number reported cases of acute conjunctivitis with unusual swelling of the lids but without membrane or skin lesions. Three cases were apparently episodes in the course of unusually severe trachoma, and one case was apparently Parinaud's conjunctivitis. Three cases, however, were of sufficient resemblance to warrant describing them in detail. One seems to be an exact counterpart of the cases we have seen.

The case reported by Drs. Caton and Starr of Concordia, Kan., was that of a farmer engaged in gathering his harvest when the infection took place. "The left eye only was involved, the upper lid being highly purple and

sagging over the lower. Large patches of membrane were present both on the bulbar and palpebral conjunctiva. The right eye was never involved. The cornea showed no involvement but a slight haziness, which we thought was due to pressure." This patient did not remain for treatment, but it was subsequently learned that he recovered.

Dr. E. N. Robertson, also of Concordia, Kan., reported the case of a farmer, aged 58, who was working with horses. "He stated that four days previous to coming to our office, he woke with his left eye swollen shut, but no pain and very little discharge. He also said that he was subject to colds, and was having a cold at the time he first noticed the swelling in his eye. The day before coming to us, he had had considerable pain in the eye. Examination revealed the upper lid hard, red and swollen, so that it slightly overlapped the lower lid. It was impossible to evert the lid, but by having the patient look down and by the use of retractors, we were able to examine a good portion of the eye. There was a marked chemosis of both ocular and palpebral conjunctivae. There were several small ulcerated areas on the conjunctiva of the upper lid, more marked along the inner third. There was considerable lacrimation and slight mucopurulent discharge. The cornea was clear and free from ulceration. The vision was practically normal. The preauricular, as well as some cervical glands on the left side, were swollen. There were no pustules on the nose and cheek, but we were able to pick a membrane from and around the ulcerated areas on the upper lid.

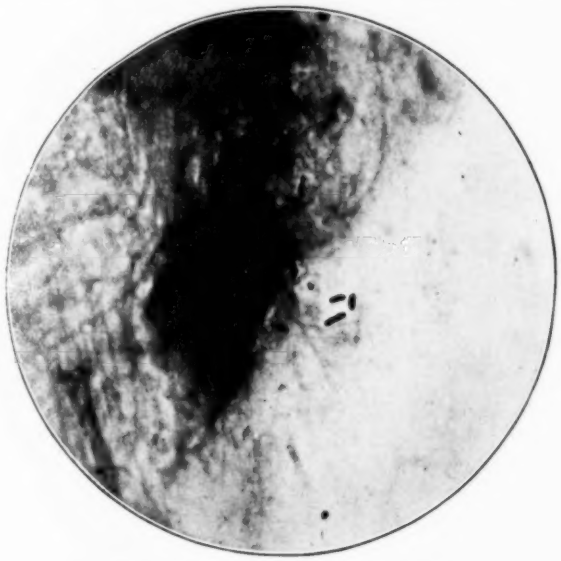

Fig. 6. (Case 3.) Smear of membrane.

We made a smear from one of the ulcerated spots, but it was negative. From a twenty-four hour growth on agar, we found practically a pure culture of a small, short diplobacillus. Not being prepared to work out the bacteriology carefully, we sent a specimen of this culture to the state laboratory and received a report that the growth showed Koch-Weeks bacillus. While the bacillus did look like the Koch-Weeks, still the fact that it grew so readily on agar made us doubt its identity. The only treatment we used was occasional applications of 4 per cent. silver nitrat to the accessible ulcerated areas and cold applications, while the patient used a 20 per cent. solution of argyrol. After about five weeks, the swelling all disappeared and the eye looked quite normal."

The case which most resembles ours was reported by Dr. L. Robert Forgrave of St. Joseph, Mo., and concerned a farmer, aged 22. "The upper lid of the right eye was hard and very much swollen. There was a serous discharge which appeared slightly purulent, which later proved to be pieces of membrane. There was a distinct false membrane with pustules along the margins of both lids, extending onto the skin as far as the brow above and for probably an inch below. Those below were grouped more particularly around the external canthus. There was a decided swelling of the preauricular glands. This man gave a history of being struck in the eye with a small piece of weed. The microscopic findings were remarkable for the few germs shown, only a few staphylococci and occasional streptococci were found. I had scrapings from the pustules taken and the secretions of the eye reexamined with the same results. I did not notice the unilateral characteristics of this case, as I isolated the left eye, but it is possible there would have been no extension had I not done so. I treated this man with ice packs, permanganat irrigations, and argyrol instillations. He made a nice recovery with no unfavorable results, except the loss of the cilia on all of the upper and most of the lower lids, and some scarring of the lid margins. He was dismissed from the hospital after eighteen days."

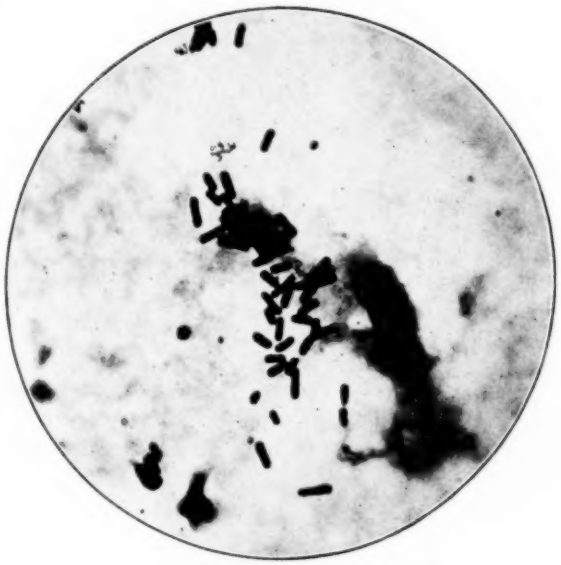

Fig. 7. (Case 4.) Smear of pustule.

BACTERIOLOGIC SUMMARY.

[The details of the laboratory findings have been published in the Transactions of the Section on Ophthalmology of the A. M. A., 1921, page 234.]

All cases showed staphylococci, usually in both membrane and pustules, and usually in smears as well as cultures. In five, this was *S. aureus;* in one, *S. albus*. Of three strains tested by animal inoculation, one proved markedly pathogenic, one slightly pathogenic, the other not at all. Two showed streptococci in large numbers. All showed slender gram-positive bacilli in moderate numbers in either membrane or pustule, which resembled *B. xerosis*, tho only one strain was tested for pathogenicity. The bacilli never showed the typical polar staining of *B. diphtheriae*, but a predominance of clubbed and barred forms in culture, and in the absence of any other evidences of diphtheria or history of exposure to it, their identifica-

tion as *B. xerosis* seemed the most probable one.

One showed the organism called *Bacillus A 1*, which produced a moderate conjunctivitis in one animal.

Bacilli resembling the large gram-positive spore bearer, found in such profusion in Cases 4 and 5, were found in the smears of all cases except Case 1. In Cases 3 and 6, only a few such organisms were found in smear, and were thought to be staphylococcic infections of the skin due to the excoriation and pressure from the original condition, tho Dr. Harold Gifford from the first emphasized them as a distinct feature of the cases.

While such complex bacteriologic findings, not complete in all details, make any definite conclusion as to etiology impossible, we believe that *B. diphtheriae* can be ruled out; and since

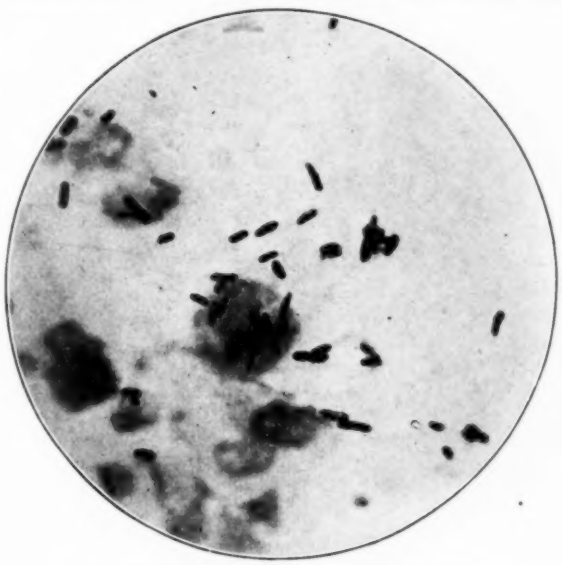

Fig. 8. (Case 5). Smear of conjunctival secretion.

may possibly have been atypical xerosis bacilli. In Case 2, however, their arrangement in chains made a distinction certain, while in Case 6, a culture was obtained similar to that in Case 5. A pure culture was obtained anaerobically in two cases. One of these strains produced a severe conjunctivitis in one guinea-pig, negative results in others. The other gave negative results in a limited number of animals. A rather meager investigation of these two strains with the serum of three cases gave negative results. Anaerobic cultures were made only in the last three cases.

Case 1 was rather summarily investigated. It is also to be regretted that at first the importance of the skin lesion did not sufficiently impress us, so that no investigation of their contents was made in Cases 2 and 3. They the cases with streptococci were not essentially different from the others, we believe these cannot have been the primary agent. The staphylococci, for reasons given before, we are inclined to consider as secondary occupants of the field. They were not found as the predominant organism in the smears.

In the case of the large gram-positive bacillus, however, record of its presence in five out of six cases seems more important, since any similar organisms are among the rarest findings in the conjunctival sac or on the lid borders. Tho animal inoculations gave no conclusive results, it is well known that animals differ in their susceptibility to organisms pathogenic for man. The serologic tests, tho negative, were not at all comprehensive. Hence, tho it cannot be concluded that it was the

etiologic factor, its presence in these cases seems the most interesting point in our laboratory findings. The possibility of its spores, living and viable at outdoor temperatures, having got into the eyes from vegetation or dirt and having germinated there, seems not so very unlikely.

REVIEW OF THE LITERATURE

In searching for cases similar to those we have observed, it is difficult to be sure that all reports which may have concerned such cases have been examined. Taking the four most striking features which have marked our cases, enormous swelling of the lids, swelling of the lymph nodes, ulcers of the skin of the lids, and membrane on the conjunctiva, we have sought out available reports on membranous, pseudomembranous or diphtheritic conjunctivitis, gangrene of the lids, and some of the reports of Parinaud's conjunctivitis.

Coppez[1] in an exhaustive monograph, considers most of the reported cases of membranous conjunctivitis up to 1897. He includes all types with membrane formation, and from his work, the deduction seems unavoidable that no sharp distinction, either clinical or etiologic, can be drawn between the mild or superficial and the deep or interstitial forms. All gradations are observed between them, and while *B. diphtheriae* is the commonest cause, various organisms may cause either type. He quotes several cases to show that *B. diphtheriae* may cause a simple catarrhal conjunctivitis without membrane formation, while even these catarrhal cases may present all the toxic complications of the deep form, paralysis, and even death. Sourdille[2] was able to produce all of these stages in animals by graded applications of chemical agents as well as by *B. diphtheriae*. If we accept this, we escape the confusion in terminology between membranous and pseudomembranous conjunctivitis which has befogged our conceptions of this disease.

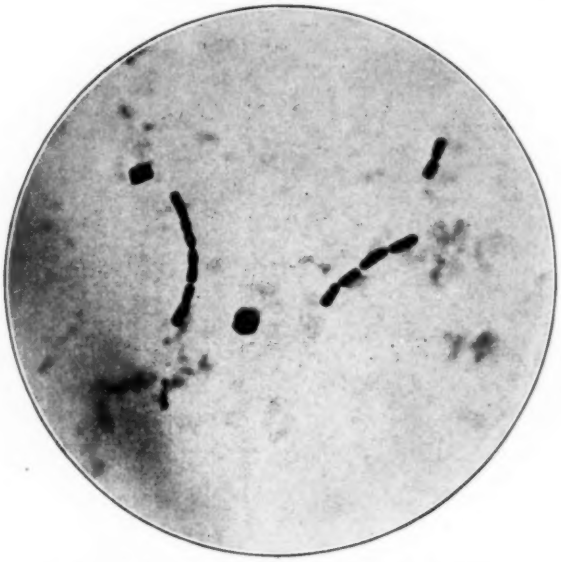

Fig. 9 (Case 5).—Culture on anaerobic serum slants.

In relation to the present cases, Coppez' description of the deep form, most often due to *B. diphtheriae*, tho sometimes to other organisms, is worth repeating. After a period of from one to two days, in which only a peculiar shiny appearance of the conjunctiva is noted, the period of fibrinous infiltration sets in. The upper lid becomes tensely swollen, dark with congestion, and so hard as not to be everted without an anesthetic. The membrane covering the palpebral and often the bulbar conjunctiva is thick, and detachable only in shreds,

leaving a pale subconjunctival tissue which does not bleed. The skin of the lids and sometimes of the forehead, cheeks and nose presents ulcers covered with grayish exudate. The ciliary border is ulcerated and bleeding. The preauricular and cervical glands may be enlarged. This is followed by a period of suppuration, when the lids become soft, and then by one of cicatrization, in which granulations like those in trachoma appear and may last for months, before the conjunctiva becomes smooth and scarred. Of his own fifteen cases, all but four showed skin lesions, tho in several of these, they may have been due to preexisting eczema or impetigo. All were due to *B. diphtheriae* except two, probably due to streptococci. While the clinical picture resembles very closely our cases, it must be noted that all of his cases were in children, the oldest being 6 years old, and most infants under 2 years. Moreover, all but two were binocular, while in two others a catarrhal conjunctivitis only occurred in the second eye. He illustrates from the literature the occasional occurrence of a membrane in gonorrheal, Koch-Weeks, and pneumococcic conjunctivitis, but none of these cases showed skin lesions. Of the sixteen cases quoted which were due to streptococcus, only his own two cases apparently showed skin lesions. In the first, a boy 3 years, an ulceration at one internal angle spread all over the lower lid. Both corneas were lost. In the second, a girl of 9 months, ulcers appeared on both left lids, the right eye showing only catarrhal conjunctivitis. Both children died of pneumonia, and both strains of streptococci proved very virulent for animals. The cases apparently due to staphylococci were milder, but one of Pichler's cases, a girl of 2, showed eczematous lesions of the face, and the girl of 6 months, whose case was reported by Van der Straeten, had a severe type with perforation of the cornea, and showed also impetiginous lesions of the face. In both of these, however, the skin lesions were probably preexisting.

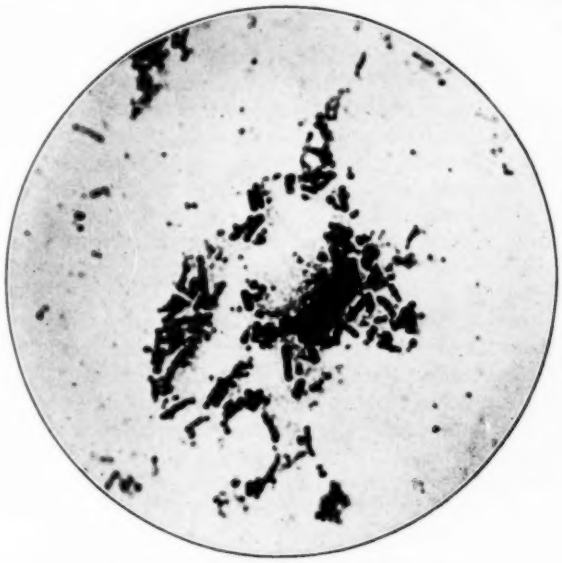

Fig. 10. (Case 6.) Anaerobic culture.

Of the textbooks, Axenfeld[3] describes necrotic areas on the skin of the lids covered by membrane, as of frequent occurrence, and mentions cases in which a whole lid has become gangrenous.

Ball[4] states that any areas of skin over which the secretion accumulates may become abraded and covered by membrane. Harman,[5] considering seven cases of the deep form in his observation, describes "the marked ex-

coriation and necrosis of the skin, to so severe an extent in one case as to present the clinical picture of noma." He gives illustrations of this case and one other with patches of membrane on both lids. (These, with Axenfeld's, are the only illustrations we have seen showing the skin lesions.) His cases were all in very young children, and all but one were monocular, in which last point his experience differs from that of most observers. All were due to *B. diphtheriae,* except one severe case in a 2 year old child, with marked skin lesions, due to *Streptococcus brevis.* De Wecker[6] states that it often extends to the skin of the lids, occasionally even producing symblepharon. Von Graefe[7] mentions the extension of the membrane to the skin near the lid borders, forming discrete plaques.

Meyerhof[8] describes two cases of the very severe, deep form, due to streptococci; and in both of these impetiginous or herpetic lesions were present on the skin of the lids. Both were children under 6. He describes another case in a girl of 3, in which streptococcus, Koch-Weeks bacillus, pneumococcus, and staphylococcus were present, with similar skin lesions. All three cases presented swelling of the glands. In his case due to *B. diphtheriae,* he has often seen the membrane extend into the skin of the lids, and states that symblepharon may occur.

The eczematous conditions of the lids mentioned as common by Schmidt-Rimpler[9] and described as an occasional accompaniment of the condition by others, is probably of a different nature, simply the scrofulous lesions often seen in undernourished children.

Of Jessop's[10] thirteen cases, one girl of 2 1/2 years showed a tremendous boardlike swelling of the right lids, with membrane extending onto the skin of both lids. This disease remained monocular, and the cornea was spared. *S. aureus* alone was found, but antitoxin was given. In Manz[11] case, that of a girl of 3, swelling of the lids was so great that a canthotomy was performed, the wound becoming covered with membrane.

Hudson and Panton[12] describe a monocular case in a boy of 16 with infection of the skin of the lid borders and swelling of the glands. The membrane was superficial and the disease ran its course in one week. *S. aureus* only was found. A second case, a girl of 13, showed many flattened vesicles along both lid margins. *Staphylococcus albus* was the only organism found. In still another case, a boy of 2, in which both *B. diphtheriae* and streptococcus were found, a pustule developed on the cheek below the eye, which gave only the streptococcus on culture. They mention also two other cases due to *S. aureus,* one to *S. citreus,* two to *S. albus,* and one with *S. aureus* and Koch-Weeks bacillus, as all showing membrane and superficial necrosis of the skin near the lid borders. Most of these were in young children, and all but one were of the superficial type.

From a purely bacteriologic point of view, the reports indicate that besides *B. diphtheriae,* the streptococcus especially may produce severe membranous conjunctivitis, and that more exceptionally the gonococcus, Koch-Weeks bacillus, and pneumococcus may do so. Such competent observers as Coppez, Hudson and Panton and others believe that *S. aureus* and even *S. albus* may also be incriminated. In spite of this, and in spite of having seen cases of severe conjunctivitis in which no other organism could be found, we are inclined to question whether these organisms, almost universally present on normal lid borders, and so often seen as the cause of severe styes or lid abscesses with only a moderate conjunctival hyperemia resulting, can act as the primary invader of an intact conjunctiva to produce such a clinical picture. It seems more likely that the primary organism has escaped observation in these cases, the staphylococci being secondary occupants of the field.

For their bacteriologic interest, there may here be mentioned a few cases of membranous conjunctivitis apparently due to more unusual organisms. Such are the cases of Attias[13] due to a pathogenic *B. subtilis* and Gehrke and Kain,[14] who found a gram-negative bacillus which produced membranous conjunctivitis in rabbits. Barriére[15] and Verderame (quoted by Barriére) found *B. pyocyaneus,* which proved pathogenic,

tho not producing a membrane in animals. The meningococcus has occasionally been found, as by Anarygros and Moisonnier, quoted by Guglianetti.[16]

Many cases have shown mixed infections, like our cases, and Sourdille[17] has emphasized the importance of the secondary organisms. He believes the cases in which the staphylococcus is associated with *B. diphtheriae* are usually of the superficial type, those with streptococcus and *B. diphtheriae* usually of the deep type, with corneal involvement. Howe[18] also emphasizes the importance of the diplostreptococcus which he found with *B. diphtheriae* in his chronic cases.

Gangrene of the lids, of a type deeper than in most of the previous cases, has been reported as a complication of diphtheritic conjunctivitis. Both Axenfeld and Harman mention it, as stated above. Schillinger's[19] case, in a 14 day old infant, was considered diphtheritic, tho the organisms were identified by smear only. Vix'[20] case of spontaneous symmetric gangrene of the lids and of the skin around both tear sacs in an infant, was also thought to be probably diphtheritic, tho bacteriologic findings were negative. Steffens (quoted by Pes) obtained *B. diphtheriae*, staphylococcus and streptococcus in a diphtheritic gangrenous process of the lids without any conjunctival involvement. The case was that of a child, aged 6 weeks. Randall[21] observed severe spontaneous gangrene of the lids in three healthy children of a family, aged 1, 3, and 5, but no conjunctival membrane is mentioned, and tho *B. diphtheriae* was found in one case, there were no other evidences of diphtheria, or any exposure to it, so its significance was questioned. Derby[22] mentions these cases and that of Mori and Yamamoto. Other cases of gangrene of the lids have shown less resemblance to the present cases. Those due to anthrax and those occurring in erysipelas show little in common with them, nor do the cases occurring as a complication of measles, chickenpox, and whooping cough in rundown children.

One case of Morax'[23] is interesting as it occurred in a man of 44, two weeks after he had pricked his lid on a piece of straw. He suffered with fever and chills and enormous swelling of the right lids and cheek, with a row of herpetic vesicles on the lid borders. The phlegmon broke, forming six discharging ulcers, which healed in a few days. A virulent streptococcus was found. No membrane of the conjunctiva was mentioned, but the lids could not be opened for observation till the swelling had gone down, as in our Case 4.

Possek's[24] case had no membrane but is worth mentioning, as it occurred in one eye of a girl, aged 28, with nothing but a bad cold preceding it. Swelling of the lids was extreme, so that the conjunctiva could not be seen. Lymphatic involvement extended to the axillary nodes. On incision, no pus escaped, only a whitish lardaceous material, apparently much like that seen in our cases. Repeated cultures gave only *S. aureus*. He reports a similar case in a man, aged 32, also occurring without trauma, after a cold and fever. There was a slough of the superficial layers of one lid. No membrane is mentioned.

One case reported by Pes[25] seems to resemble some of our cases more closely than any of the cases mentioned. It occurred in a peasant woman, aged 48, who was scratched on both of the lids and on the globe by a hen's claw. Rapid swelling of the lids ensued, necrotic ulcers developing on the skin, with sinuses extending deep into the tissues. A thick pseudomembrane covered the ocular conjunctiva, the cornea became necrotic and panophthalmitis developed. Adhesions were left between the lids and globe. Staphylococci and streptococci were found in the smears. *S. aureus* was found only in cultures, the strain proving pathogenic for animals. His other cases were of severe gangrene of the lids in adult males, secondary to trauma, but no conjunctival membrane is mentioned. Photographs illustrate the lid conditions.

For the sake of completeness, one other type of case with skin lesions associated with membranous conjunctivitis may be mentioned. This is herpes iris, as described by Fuchs[26] and Hanke.[27] Various organisms have been found in the membrane; streptococci, staphylococci, and even one of

the *B. coli* group; but these are probably secondary, and the etiology of the skin lesion is not known. The diagnosis should be clear from the peculiar skin lesions elsewhere on the body, tho Hanke maintains that it may affect the conjunctiva alone.

Parinaud's conjunctivitis presents features which should serve to differentiate it easily from these cases. In it the conjunctival ulcers are typically discrete, without any diffuse membrane formation, the characteristic granulations are present, and skin lesions do not occur.

TREATMENT

In the diphtheritic cases, all now believe that antitoxin, as first used by Coppez, is the most important therapeutic agent.

Local treatment should consist chiefly in hot rather than cold compresses, and frequent irrigations with mild antiseptic solutions. During the stage of extreme swelling, the oculist is almost helpless, and perforations of the cornea often occur under careful treatment in the best hands, especially in the streptococcus cases. The emphatic advice of Coppez and de Wecker to avoid all unnecessary handling, and especially to avoid the use of solid caustics or strong silver nitrat solutions in this stage seems justified. If a later purulent stage appears, silver nitrat may be useful. It seems best, as Coppez states, never to try to remove the membrane, except small pieces for examination. He even advised against the trauma of frequent copious irrigations, and uses petrolatum with a small amount of iodoform or aristol on the lid borders and in the sac, removing only the fluid secretion with cotton several times a day, when the petrolatum is freshly applied.

Lemon juice has a traditional popularity in conjunctivitis with a membrane (Guibert[28]). Vian[29] reports success with applications of crude oil to the membrane.

The use of antistreptococcic serum might seem indicated in cases of clear streptococcic origin, but in the presence of such complex bacteriologic findings as our cases showed hardly seemed justifiable. (In the one case in which the smears showed numerous cocci resembling pneumococci, polyvalent antipneumococcus serum showed no evident favorable influence.)

SUMMARY OF LITERATURE

Severe cases of membranous conjunctivitis due to *B. diphtheriae* show a great resemblance to our cases, often presenting their four main features. They nearly always occur, however, in young children, are usually bilateral and usually show involvement of other mucous membranes or a history of exposure to diphtheria. In these severe cases, the frequent corneal involvement has been of a deep character, usually with perforation or sloughing of the entire cornea in the absence of specific treatment. They have usually occurred in city dwellers, without a history of trauma.

The streptococcic cases may also show a great similarity, but skin lesions have been rarely reported, and these cases (Coppez, Harman) were in young children.

Some of the cases attributed to staphylococcus present many features in common. One of Hudson and Panton's cases, in a boy of 16, showed the membrane, skin lesions and swollen glands, and was severe only in one eye. Three of their other cases, two in girls of 7 and the other in a girl, aged 1 year, were somewhat similar, but with a more superficial membrane and milder course. Jessop's case was similar and was monocular, but was in a girl, aged 2 1/2 years.

In the cases of membranous conjunctivitis due to other organisms, skin lesions have apparently not been described.

Both of Morax' and Possek's cases of lid gangrene were monocular and occurred in adults, Morax' case evidently being that of a farmer with a history of trauma, but in them no conjunctival membrane was described.

The case showing most similarity to our cases was that of Pes, being monocular, in an adult peasant woman, and being accompanied by membrane on the ocular conjunctiva. Here the

simultaneous trauma to the lids and globe with accompanying infection was doubtless responsible.

CONCLUSIONS

1. Six cases were seen, all but two of which presented the common features of enormous swelling of the lids, swelling of the regional lymph nodes, superficial necrosis of the skin of the lids, and membrane on the conjunctiva. The other two, tho lacking one or two of these signs, were similar enough to warrant their inclusion as atypical cases.

2. All occurred in healthy adult or adolescent males engaged in outdoor occupations.

3. Three gave a history of slight trauma to the conjunctiva or lids. None had been exposed to diphtheria or showed any signs of it on other mucous membranes.

4. Mixed infection was present in all cases, the streptococcus, staphylococcus, *B. xerosis* and a large gram-positive anaerobic bacillus being found. The last was probably present in five of the six cases, and on account of the rarity of similar findings on normal lids or conjunctiva, is considered as possibly having an etiologic relation to the cases.

5. The cases seemed to form a distinct enough clinical picture to warrant their inclusion in a group for which the name "agricultural conjunctivitis" is suggested.

We wish to express our warmest appreciation to our chief, Dr. Harold Gifford, who saw most of the cases with us, and urged us to report them. Also to Dr. John T. Meyers and Dr. E. G. Cary, who went over some of the bacteriologic material with us.

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BILATERAL BLOOD STAINING OF THE CORNEA.

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This is the detailed report of a case in which the blood staining of the cornea was bilateral, and followed iridectomy for multiple adhesions of the iris to the lens. Read before the Eye and Ear Section of the Illinois State Medical Society, May 17, 1922.

Blood staining of the cornea has been recognized as a clinical entity for many a year, altho it has been only within the last decade that the nature of the staining elements has been identified. A fair share of the cases of this disease eventually clear, thus obviating the possibility of staining experiments and, as it is impossible to determine a priori which cases will clear, comparatively few are available for chemical analysis of the staining elements during the early stages. The case here reported is of interest from another standpoint, and as far as a search of the literature reveals, it is unique. The findings will be described in somewhat more detail than a mere case report would warrant because of the unusual condition.

August 20, 1919, M. G., female, aged 35. About 6 months ago, inflammation of the right eye followed shortly by similar inflammation of the left. No treatment. Condition gradually subsided and recurred frequently. No etiologic factor known. Gradual decrease in vision. Status Praesens—R. Faint ciliary injection. Multiple posterior precipitates on the cornea. Anterior chamber shallow. Iris somewhat atrophic and pupillary edge very serrated by multiple dense posterior adhesions, which almost entirely prevent dilatation of the pupil. Some exudate on and opacity of anterior lens capsule. Vitreous hazy, but no formed floaters. Fundus is seen hazily, but seems normal. Vision, 0.1. Tension normal.

L. Eye pale. No posterior precipitates. Iris atrophic, but not as markedly so as in the right. Pupillary edge is free only in upper quadrant and bound down elsewhere by multiple posterior adhesions. Anterior capsule clearer than right. Vitreous hazy. Fundus is hazy, but seems normal. Vision, 0.6. Tension normal.

A search for etiologic factors of the old iritis revealed no general pathology beyond a chronic constipation. The usual local treatment of atropin, dionin, and heat was ordered, and K. I. was given internally. The condition of both eyes continued for about a year with alternate subacute exacerbations of the iritis and remissions, complicated by intermittent increase in the intraocular tension. The vision continued to decrease slowly.

Operation.—July 8, 1920.—Bilateral keratome iridectomy (upward). The pupillary edge of the right iris could not be freed and consequently the sphincter was left intact. Both anterior chambers filled with blood which was immediately renewed upon removal.

July 11, 1920. R. Moderately injected. Wound well closed. Anterior chamber full of blood. L. Some edema of lid. One corner of wound blocked with a tag of iris tissue. Tension increased.

July 14, 1920. Both eyes becoming paler. Both corneae show a good window reflex, but are dull reddish brown in color and are completely opaque. Ordered dionin, heat, K. I. internally, and sweats.

July 19, 1920. No change in condition. Started subcutaneous injection of 8 mg. of fibrolysin every other day.

July 27, 1920. Color of right cornea has changed from a deep red brown to a green brown.

July 30, 1920. Color of left cornea now changed to green brown.

August 6, 1920. Beginning clearing of right cornea in extreme periphery.

Sept. 3, 1920. Clearing of right cornea advancing rapidly. Tension normal. Left eye pale, but flushes

easily. Beginning of clearing of cornea in extreme periphery. Tension minus.

Sept. 25, 1920. Nasal half of right cornea has cleared sufficiently so that iris is barely visible. Temporal half still greenish and opaque. Anterior chamber normal. Iris details not clearly visible. Pupil is filled with membrane and is drawn upward. Complete opacity of lens. The left cornea is somewhat flattened. The absorption of the greenish opacity is very slow and the cornea is becoming vascularized. A minute tag of iris is still incarcerated in the angle of the wound. The iris details are not visible. There seems to be a complete opacity of the lens. Tension minus.

Jan. 27, 1921. The right cornea is normal except for a slight area of opacity in the inferior temporal quadrant. Discission of the right lens was performed, very cautiously for fear of further hemorrhage.

The left eye is unchanged from the last record.

Feb. 25, 1921. Extensive needling of the right lens. There was not a great deal of reaction to this operation, and altho there was a slight hemorrhage into the anterior chamber, the blood was promptly absorbed.

June 21, 1921. No change in the external condition of the right or left eye. An unsuccessful endeavor was made to perform a central iridotomy with a Ziegler knife.

July 7, 1921. A broad keratome incision was made in the right cornea and an *irito-ektomie* of the Elschnig type was attempted. Altho no iris tissue was removed, the pupillary edge of the coloboma was freed and a large opening was made thru the membrane that filled the coloboma. Behind this was an irregular mass of lens cortex and capsule.

August 3, 1921. The membrane reformed, contracting the iris down and completely closing the coloboma so that the lens is not visible. The clearing of the left cornea has ceased, despite all forms of local treatment, and organization of the infiltrated cornea is becoming apparent. With a Graefe knife, a 1/3 incision was made thru the right cornea and with the tip of the knife, a puncture and counterpuncture thru the iris was made. On finishing the cut, a fair sized coloboma was produced. Thru this considerable lens cortex was removed with a Jaeger spoon. About three beads of vitreous escaped. The eye recovered from this extensive operation readily and with but little irritation.

Dec. 7, 1921. The right eye was pale. The cornea showed several peripheric areas of scar, corresponding to the extensive operative wounds. In the coloboma were some capsular remains that covered the optical axis. These were severed by a simple needling.

April 1, 1922. Right eye pale. The cornea is slightly flattened and shrunken and shows numerous peripheric scars that are the result of the various operative procedures, but there is no opacity due to the blood staining in evidence, nor can any be discovered with the slit lamp. However, the lymph system of the cornea is very irregular with marked enlargement of the lymph channels. The anterior chamber is moderately deep in the center but is shallow in the upper and outer periphery, where the iris lies near to the posterior surface of the cornea. The iris is irregularly atrophic and shows much scar tissue on its surface. There is a coloboma upward that is closed with a membrane. In the center, corresponding to the pupillary area, is a coloboma of irregular outline, which lies below the former margin of the pupil, the latter having been displaced upward. Thru this coloboma, a clear view of the fundus can be obtained. The vitreous is slightly hazy, but the retina and nerve head present no pathology. The tension of the eye is normal. + 11.00 sp. ⌒ + 3.00 cyl. ax. 40 = vision of 0.6, and with reading correction added, Jaeger 2.

The left eye is pale. The cornea is flattened, and at the upper inner edge of the former iridectomy wound is a small black subconjunctival area of former iris prolapse. The cornea is diffusely opaque, and with the slit lamp

the opacity is seen to be within the corneal stroma, but evidently not involving the anterior or posterior membranes. The individual areas of opacity are not sharply outlined, but merge into one another, with partially clear areas of corneal tissues between. The opacity is greyish white in color. There is a considerable vascularization by deep scleral vessels, four main trunks entering the cornea. There is not much ramification of the vessels. Corneal nerves can be seen at times and these appear to be thickened. The anterior chamber is shallow. Iris details cannot be seen, but the pupil appears to be dilated with a regular coloboma upward. The lens is entirely opaque. The tension is normal and the vision is light perception with good projection.

According to Maghy[9], blood staining of the cornea was first described by Baumgarten[1] in 1883, whereas in reality the first description of the condition emanated from Schmidt-Rimpler[14] in 1875, and was called by him "Apoplexy of the Cornea." The present name was given the condition by Hirschberg[8] in 1896. In all, some 43 cases have been described by the various authors, about half of them accompanied by an anatomic study of the cornea. Undoubtedly many more cases have been observed, but have not made their appearance in the literature.

Up to 1913, Kusama[11] was able to collect the reports of 21 cases, to which have been added since cases by the following authors: Wells[17]; Buchanan[3], 5 cases; Fisher[6]; Begle[2], 4 cases; Maghy[9], 3 cases; Wernicke[18]; Matsuoka[10], 2 cases; Pissarello[12], 3 cases; Elschnig[5]. In practically all of the cases studied anatomically, there was unanimity regarding the presence within the cornea of the highly refractile oval bodies so characteristic of this condition, which were first described by Treacher Collins[4] and shortly after by Vossius[16] and somewhat later by Roemer.[13] These authors all agreed that the bodies were probably derived from the blood elements that found their way into the cornea, but careful inquiry into the chemical nature of the bodies was not possible.

In 1914, Begle[2] made a spectroscopic analysis of a blood stained cornea and established the fact that "In this condition, a solution of hemoglobin is imbibed by the cornea. To the presence of this hemoglobin solution the greenish or brownish discoloration of the cornea must be ascribed." But his method of analysis failed to reveal the chemical nature of the intracorneal refractile bodies and led him merely to the suggestion that "they are elementary noniron containing split product of hemoglobin, despite the fact that positive reaction for a number of the end products of protein disintegration were not obtained."

Simultaneously there appeared an article from the Tokio Clinic by the Japanese Regimental Surgeon Kusama[11], whose investigations led him to the following conclusions: "It is very probable that the blood in the anterior chamber loses its normal characteristics, (this is the theory advanced by Gutmann[7]) and that the hemoglobin which has diffused out of the red blood cells, forces its way into the parenchyma of the cornea by diffusion. From the hemosiderin thus carried into the cornea, which eventually loses its iron, the peculiar refractile bodies arise. From their characteristics, these belong to the group called by Unna[15] "Melanosiderin." Maghy[9] agrees with this view in the main.

In many of the cases described clinically, the entire cornea was not involved in the staining process, while in those in which the entire cornea became opaque, it was very noticeable that there was a fairly clear band of normal corneal tissue at the limbus. This is ascribed by Maghy to the better lymph circulation of the cornea in this area. The staining usually followed perforating or blunt injury of the eyeball; but in some cases was subsequent to an iridocyclitis, particularly of a persistent and chronic type. The condition appeared in from three days to three months after the exciting factor set in, and was almost always dependent upon the presence of more or less blood in the anterior

chamber. In some cases, the chamber was full of blood, whereas in others, there was but two or three millimeters of hyphema. A few cases of entire clearing of the stained cornea have been reported; but in the majority the condition persisted or complications arose that necessitated removal of the eyeball. The lens became cataractous in some of the cases, while in others the nutrition of the lens did not appear to be disturbed.

The case here reported presents the following unusual features: (1) Both corneas became stained with blood at the same time, subsequent to bilateral iridectomy. This procedure admits of discussion. Many prominent ophthalmologists believe in and practice operation upon both eyes at the same time, while others condemn such practice. Many factors, the discussion of which is not pertinent here, must needs be taken into consideration, not the least among which is the economic situation of the patient. As far as a search of the literature shows, this is the only bilateral case on record.

(2) The blood staining appeared on the sixth day after the iridectomy, during which time the chambers were full of blood. The diagnosis was made tentatively on the fifth day, but was not definite until the sixth. This time element coincides with that found in the majority of the case reports.

(3) The intraocular tension, subsequent to operation, was at no time increased in the right eye, and eventually this cornea became perfectly clear.

(4) The intraocular tension in the left eye became increased immediately subsequent to the operation and in this eye the cornea did not clear. In this eye there was a small iris prolapse in one corner of the wound; and whether this was incidental to or causative of the increased tension and subsequent opacity of the cornea, or whether there was some underlying predisposition of that eye toward the unfortunate outcome cannot be told. What is the relation between intraocular tension increased subsequent to the hemorrhage and failure of the cornea to clear?

(5) In both eyes, the opacity of the cornea extended completely to the limbus and involved every particle of transparent cornea. In this fact, this case varies from all heretofore reported.

(6) The right cornea cleared completely, while the left remained slightly more than translucent. Both eyes appeared the same in the beginning, with the single exception of the small iris prolapse in the left, and both were subjected to the same treatment. Incidently, it is very questionable whether treatment had any influence upon the clearing process at all. That difference in regeneration is beyond the possibility of explanation.

(7) The right eye was subjected to six more or less violent operative procedures, involving at different times considerable hemorrhage into the anterior chamber without any further staining of the cornea. Did a localized immunity to the split products of hemoglobin, either with or without iron, come into being? Or did Descemet's membrane develop a closer mesh, that prevented the diffusion of hemoglobin into the cornea; or did the blood that appeared during the later operations in the anterior chamber retain the hemoglobin within the red blood cells, or did the blood in the anterior chamber absorb so rapidly that there was not sufficient time for the diffusion of the hemoglobin into the aqueous and subsequent diffusion into the cornea?

(8) The lenses in both eyes became completely opaque. This was probably due to the nutritive disturbance induced by the inflammatory reaction of the anterior uvea and the consequent exudate.

(9) The remarkable connective tissue forming capabilities of the right iris were evidently a manifestation of the toxic irritability of the tissue.

(10) The ultimate corrected vision of the right eye is better than the vision of that eye was before the hemorrhage and blood staining occurred.

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THIRD NERVE REFLEXES.

J. P. Williams, M.D.

LINCOLN, NEBRASKA

Ophthalmic migrain or scintillating scotoma, disturbance of heart action, profound vertigo and disturbed sleep are here grouped as reflexes. The most important cause is exposure to bright light which disturbs the pupil reflex. Accommodative strain is next and muscular imbalance a third cause. A case is cited in which hyperphoria when uncorrected caused unconsciousness. Read before the January meeting of the Omaha and Council Bluffs Ophthalmological and Oto-Laryngological Society, see p. 654.

Some years ago, when speaking of muscle imbalances with an oculist of wide experience, he made the remark to me that he believed that if we could uncover and correct the latent hyperphorias, the lateral muscles would largely take care of themselves. This was at a time when it was quite the custom, and the proper thing, to do tenotomies on the slightest excuse, some reporting as high as twenty or thirty operations on a single individual for lateral imbalance.

In a recent conversation with a colleague of ability and experience, he remarked that he rarely corrected muscle errors mechanically or surgically, and I inferred from his remarks that he made but little effort to uncover latent muscle errors with a view to relieving the symptoms that I shall detail presently. Somewhere between the two extremes there is a proper mean. It is quite easy for any of us to fall into the habit of becoming extreme in any of our routine examinations, and I readily recognize this weakness in myself and I shall gladly accept criticism if my conclusions seem extreme.

TYPES OF REFLEXES.

The class of cases that I wish to attribute to third nerve reflexes are not well defined in our text books. Under what is known as brief scintillating amaurosis, we have one manifestation. Zigzag flickering dark lines appear to pass before the eyes, with more or less complete obliteration of the visual field. The attack lasts usually ten to fifteen minutes, followed by a headache, often severe, and associated frequently with aphasia, marked disturbances of memory and speech. There is often a distinct aura such as tingling of the fingers, or feet, prickling sensation of the chest, numb feeling of the face.

In a second type the flickering blindness is entirely absent, in fact it is in the first type alone that there are any distinct ocular manifestations, and for this reason the second and the third types are more easily overlooked or misinterpreted. The patient feels ill,

weak in the knees, with frequently a sense of fear or apprehension, that he or she is about to faint. There may be a prickling sensation as tho grasping an electric wire, and in one case under observation, a stiffening of the hands and arms with rotating motion. These symptoms are sometimes associated with serious indigestion, distressing eructations of gas, and cardiac manifestations, intermittent, rapid pulse, the patient actually fearful of impending death.

The third type is one marked by profound vertigo, easily and frequently confused with labyrinthin disturbance, because of its sudden onset and violence. Apart from the fact that these patients do not usually respond to tests for labyrinthin effusions, it will be found that the vertigo is almost always relieved by lying down, closing the eyes, and above all excluding the light. While with labyrinthin disturbances, the vertigo is often intensified by the recumbent position, due to gravity particularly, and by variations in barometric pressure. I have found a barometer a most interesting and helpful office instrument in differentiating labyrinthin from ocular disturbances. The onset of the vertigo may be as sudden as when due to an effusion, and associated with vomiting in patients who have shown previous gastric symptoms. More often, the nausea is entirely absent.

The fourth type has to do with the subconscious manifestations and is often associated with night terrors. The attacks come on usually in the early hours of the night, shortly after the patient has gone to sleep. Such an one is awakened with a great sense of apprehension, pulse running up to 130, cold perspiration, prickling and numb sensation in any or many parts of the body, slowly regaining the normal state with great difficulty.

A psychologist friend, a keen observer and also a great sufferer from the first type, found that a study of dreams that he was carrying out so aggravated and increased in frequency his attacks, that he was forced to abandon his dream studies. The reflexes were being stimulated from his subconscious mind. In 1900 there was published in Science, an account of the scintillating variety, induced by light stimulation, and the psychologist who is reporting this case of himself, closes with the statement that an effort on his part to recall the scintillating figures induces a distinct sense of nausea.

These four types, which are wholly arbitrary as to division on my part, and easily overlap or merge in any group of cases, are all due, I believe, to stimulation reflexly thru some of the elements of the third nerve. The correction of all the irritations is usually necessary to give relief.

First, and by far the most important, is the correction of the light stimulant. Excessive light, particularly reflected sunlight, leads all other causes. A case illustrates this point. A teacher of a country school was a severe sufferer of type one. She boarded a mile west of the school, walking toward the sun in the morning, and again in the evening on her way home. She was almost completely relieved by moving to a house east of the school, walking west in the morning and east in the evening.

Many of these patients can easily induce an attack by concentrating for a few minutes their attention on a bright spot of light, as sunlight on a white piece of paper. Work in small offices in country towns, where the light is excessive and unbroken by nearby buildings, and above all, reflected from a white wall of a building unfortunately placed to reflect the light, is a frequent source of trouble. In one case I was unable to secure the desired results for a young lady until I induced her to change her style of hat to one that shaded her eyes, at least to a degree. The overseas cap, affording no protection to the eyes, was wholly inexcusable in an organization like our army, heralded as one seeking the highest physical welfare and efficiency of its members.

It will tax our ingenuity often to find the source of light irritation in many of these cases; and, having found it, to correct it. These patients as a

rule, are wholly oblivious of the fact that they are subjecting themselves to an unnecessary irritation, and it is only by persistent questioning that the oftentimes simple, but obscure source is uncovered. The treatment of this type is manifestly, to a large degree, a matter of hygiene.

The second source of irritation I find in the accommodative branch, closely related, of course to the pupillary. This refers particularly to the period of life when the accommodation is waning, and not so much to the refractive errors of earlier life. Indeed very many of these patients have eyes that are surprisingly near emmetropic. But a patient approaching forty years, who is already manifesting a presbyopia, is often very promptly relieved of reflex irritation, even tho manifesting no difficulty in reading so far as being able to see the print.

The third source has to do with the extrinsic muscles, and particularly the verticals. This is the type where I find the vertigo most frequent, with sudden attacks, completely prostrating the patient, from which they recover slowly with frequent remissions. Riding on the street car or being in a crowd, or at the movies, they are almost certain to suffer. Thru reflex sympathetic irritation, heart action is much disturbed, intermittent, rapid. This type rarely complains of headaches or any ocular disturbances, and is much surprised to have the eyes suspected as a cause. On examination of muscle balance, the convergence is often found low, but what is more important as I see it, is a vertical deviation all the way from a very slight amount up to a vertical diplopia of two or three degrees. On the first examination the vertical deviation may be very slight—just enough to show its drift. If these cases are followed up by placing on the patient a small vertical prism to be worn twenty-four hours and increased if more is found on subsequent tests, the latent error can be uncovered in a few days or a week's time.. This error, I do not hesitate to correct, always slightly under the developed amount, by incorporating the prism with the correction for the refractive error. These corrections I give even as small as three-eighths of a degree, as I am satisfied that the results justify this procedure. In the larger amounts, the corrections are particularly gratifying.

One case will illustrate this type; the illustration could be duplicated many times. A man, 52 years of age, apparently in good health suddenly became dizzy and fell, while stooping over a lavatory. The prostration was great, with marked gastric disturbances. At the end of two weeks time the improvement was little or none, and a most grave prognosis was given by the attending physicians. The patient found on attempting to read, a little, unusual difficulty, and for this reason the eyes were first examined. A slight vertical diplopia was found and corrected, gradually increasing until the patient was wearing a total of about three and one-half degrees. Following this, he made rapid improvement in his physical condition, to apparently normal health. At the end of six months this man left the prisms off for about four hours, while clips were being cemented on for presbyopia, and fell again unconscious; and again, twelve months later, while having the clips recemented, and being without glasses for a few hours, nearly collapsed and was saved from falling by the chance aid of a friend. These are the only attacks of vertigo he has had since the correction was put on.

These cases I am convinced have not had the emphasis put upon them in our text books, that their frequency and annoyance, both to the doctor and the patient justify. Furthermore, either they are greatly on the increase in numbers, due possibly to our ever increasing complexity of living, as for example, the movies; or else my own enthusiasm leads me to attribute to the third nerve center reflexes, an increasingly large number of functional disturbances.

NOTES, CASES AND INSTRUMENTS

GLAUCOMATOUS CUPPING WITH LOW OCULAR TENSION AFTER WOOD ALCOHOL POISONING.

FRANK A. MORRISON, M.D., F.A.C.S.

INDIANAPOLIS, IND.

J. C., married, barber, age 46, came under observation November 6, 1920. The previous history was obscure. His brother-in-law, a physician, who accompanied him, stated he had been a hard drinker for several years. This was not admitted by the patient. Both agreed, however, no complaint of vision had been made until ten days before he came under observation. It was then noticed vision was becoming somewhat misty, but did not occasion alarm. Three days before, he awakened in the morning almost blind. The patient asserts he had taken about two teaspoonsful of whiskey the night before. However, his brother stated he had drunk almost a pint of home made bay rum which he used in his business. Upon inquiry I learned this bay rum was made from deodorized wood alcohol and oil of bay, with the addition of water.

At the time of the first visit he had bare light perception. Both nerve heads were intensely swollen and edematous, measuring five diopters. The usual unfavorable prognosis was given. Under sweating and iodides he shortly recovered a great part of his vision; and when he passed from observation it was 20/30, with but little swelling of the nerves. In spite of the repeated unfavorable prognosis he considered himself well and returned to work.

March 3, 1921, he again reported, saying his vision had within the last few days become very poor and was deteriorating rapidly. Both nerves now were white and apparently in an advanced state of atrophy. No cupping sufficient to excite suspicion was present, and the field and tension not taken in view of his previous history. On March 20 he was seen again, and the cupping now appearing suspicious, a more careful examination was made, showing among other conditions a tension of 60 in each eye, measured by the McLean tonometer.

He was immediately trephined in both eyes. Healing uneventful. The filtration was perfect with a large area of edema in the region of operation. The tension after complete healing never rose in either eye above thirty-five and remained at thirty, or very close to it. That the tension has never temporarily risen at times when not under observation is rendered practically certain from the fact it was taken repeatedly, at intervals of three or four days, and mornings and evenings. Notwithstanding this continual low tension, the cupping has increased until it now measures four diopters, completely undermined and vision abolished.

ANOMALOUS MOVEMENT OF BLIND EYE ON CLOSING THE OTHER.

A. W. STIRLING, M.D.

ATLANTA, GA.

Mr. K. M. S., age 37, consulted me on January 24, 1922. His left eye had been hit by an arrow when he was four years old. His right was normal, except that it took plus 0.75 D. Sph. on plus 0.75 D. Cyl. Axis 90°. V=6/4 and J. 1. The left (homatropin and cocain) showed a pure white cataract; practically all capsule, with a spot of pigment up and in near the periphery, corresponding to a small scar in the cornea. Vision is hand reflex when hand is held to the outer side.

The interesting point is that when the right eye is closed voluntarily or by being pushed down, the left at once turns in close to the nose, while the right turns out. The left does not turn in, however, when the right is merely covered by the hand. When the patient cuts the light to the right completely off by pressing his palm over it, the left remains straight, but as soon as the palm is slipped down on the cheek so as to close the right upper lid, the left eye turns in. The in-

ward motion of the left eye appears to be associated with the closing of the right and not with the exclusion of light from the right.

The writer formed his own opinion of the case, but sent the above notes to a distinguished ophthalmic surgeon whose name is known in connection with muscular anomalies by all his colleagues the world over. In his reply he says: "Your case is of much interest to me. The explanation, if I am right, is a very simple one, but your notes are well worthy of publication, and it would be very interesting to ask the readers to crack the nut. They might think of some better explanation than mine."

AN UNUSUAL TYPE OF VITREOUS OPACITY.

L. Waller Deichler, M.D.

PHILADELPHIA, PA.

Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, January 10, 1921.

"Opacities" in the vitreous body are of common occurrence and are seen almost daily in the course of routine practice, but because of the unusual type of opacity seen in this case, it seems worthy of report.

Mrs. M. H., 35 years of age, was referred to me because of poor sight in her right eye, which to her knowledge had existed for the past five years. There have been no other subjective symptoms at any time. She believed that she had good sight in each eye until five years ago, when she accidentally discovered that "everything was a blank" before this eye. The condition has persisted with no appreciable change during this period, and she has never before sought relief for it.

She is married, no children and no miscarriages. Menstrual history normal. Has always enjoyed good health until six years ago, when she was treated for a period of eighteen months for a condition diagnosed by her attending physician as "spinal rheumatism."

This was characterized by excruciating pain in the lower lumbar region, which was referred down the course of the left sciatic nerve and associated with weakness in the extremities. She was confined to bed for one year and spent an additional six months in a rolling chair. She has had recurrences at irregular intervals since, but never as severe as the primary attack, lasting a few days to a week.

She also has a vague, indistinct recollection of an inflammation of both eyes at four years of age. There was intense photophobia in this attack, and she wore a green shield for some time, but the actual inflammation lasted only about five days.

In addition, she gives the history of a fall from a bench eighteen years ago, with injury to her left side, but no apparent injury to her head or eyes.

Examination.—Vision of O. D. was 15/200 and of O. S. 15/10 —2, which was improved by refraction to 15/40 —3 or 15/50 +2 partly and 15/10.

External appearance of cornea and anterior chamber was normal in each eye. Pupils were equal and reacted promptly to light and acommodation. Ocular movements normal. Tension normal in each eye.

O. D.—Lens clear; fine vitreous haze permitting but limited view of fundus thru undilated pupil. A mydriatic was instilled, when pupil became evenly and fully dilated.

Examination then revealed the presence of a large, ring shaped opacity, situated in front of and parallel to the optic disc, just a little behind the middle of the vitreous body. This was somewhat oval in shape, with the upper margin somewhat flattened and the lower somewhat bulging, about the size and shape of a cross section of the lens, and everywhere free except for a fine convoluted strand, which connected the temporal edge of the ring with the temporal side of the globe, near to if not actually attached to the ciliary body. This strand acts as a guy-rope keeping the opacity which is freely movable in a relatively fixed position.

View thru this ring is unobstructed as is the view around it. The disc is sharply outlined and oval at 105°.

There is no demonstrable lesion of the fundus except a small, irregularly oval area of chorioretinitis, a little below and somewhat to the temporal side of the fovea. The margins of this area are well defined, within which are seen choroidal and retinal disturbance with atrophic change and pigment heaps.

Visual field for this eye gives a small absolute scotoma corresponding to this area of fundus change. (Fig. 1.)

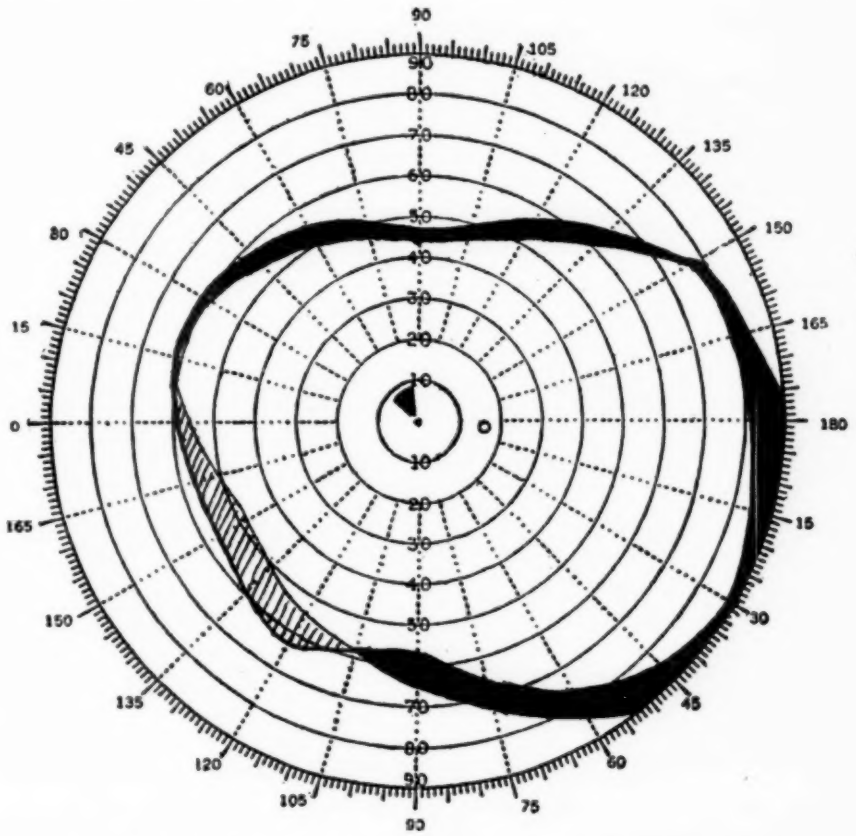

Fig. 1. Field of vision for right eye, showing small scotoma near fixation point.

Blood and spinal Wassermann reactions are negative and urinalysis is normal.

O. S.—Examination of this eye is negative with no demonstrable lesion.

TOTAL COLOBOMA OF THE IRIS.

L. W. Morsman, M.D.

HIBBING, MINN.

The term aniridia is usually applied to apparent complete absence of the iris. In such cases as have been reported in literature, where postmortem examinations have been obtained, it has been found that tags or remnants of iris tissue are present, even in those cases where it had not been detected clinically. Most of the cases reported as aniridia have been incomplete, and the term incomplete aniridia would be more properly applied.

I wish to report a case of complete bilateral aniridia of a male child, fourteen months of age. The child was

brought to the office on May 12, 1922, the mother stating that "since birth her child's eyes did not seem quite right."

Examination in this case showed a clinically complete coloboma of the iris, associated with normal fundus and media, in either eye. At the age of fourteen months, exact vision is problematic. However, with such tests as could be applied, the vision appeared quite good. A large percentage of these rare cases of complete coloboma are associated with nystagmus, strabismus, and often with such associated anomalies as conical cornea, opacities of the cornea and lens, vitreous opacities, atrophic choroidal spots, and detached retina. In this case there were no associated anomalies, and the ophthalmoscope did not indicate any refractive error of moment.

The etiology of aniridia is theoretic. Altho more than fifteen theories, urged by as many good authors, have not been proven, there is no doubt of its being a congenital defect of development, and not a destruction due to intrauterine inflammation. On making a study of case reports, a striking family tendency, as in the case of all congenital anomalies of the eye, is found, as, for example: De Beck found seven cases of aniridia (complete and incomplete) and two colobomata, in three generations; Gutbier found ten cases in four generations; Galezowski thirty-one cases in three generations; Mohr, a mother with complete, and two sons with partial; Gutfreund, a father and daughter with complete aniridia; Hamilton, a father and three sons; Despagnet, thirty-one members in one family. Excluding these just mentioned, there are a number recorded in the literature which for convenience are classified as follows: direct hereditary, 18 mothers to 31 children, 10 fathers to 19 children, and 7 showing collateral heredity. In my case, a careful survey of the family history did not reveal any eye anomalies.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Section on Ophthalmology.

February 16, 1922.

DR. MCCLUNEY RADCLIFFE, CHAIRMAN.

Externus Corrected by Tendon Transplantation.

DR. WILLIAM CAMPBELL POSEY exhibited a boy 12 years old, in whom the right eye had deviated markedly inward since birth. The rotation of the eye was normal, with the exception of outward motion in the right eye, which was absent. O.D. V. = 20/70, O.S. V. = 20/20. Double advancement of the rectus internus by the twin single stitch method was determined upon, but no trace of the right externus being found, tendon transplantation was performed; the outer halves of the exposed superior and inferior rectus muscles being united with the external portion of Tenon's capsule, which was advanced as far forward as possible. The left externus was advanced and the internus of the same eye was tenotomized. The results were surprisingly good, external rotary movement in the right eye becoming almost normal in extent and the visual axes parallel.

To what should be attributed this establishment of external rotation in the right eye? To the advancement of Tenon's capsule alone, or should we presume that the innervation of this tissue from some of the transplanted fibers of the superior and inferior rectus had an effect? It is difficult to conceive how partial tendon transplantations may be of value, when the muscle which is to receive the innervation is found to be absent, yet this is the second case which he had shown to the Section in which rotation of the eye in the zone of action of the absent muscle had been made almost normal. The refraction under atropin is as follows: O.D C. + 3.50 D. ax. 120° = 20/50. O.S. S. + 1.75 D. ⌒ C. +0.75 D. ax. 90° = 20/20.

Discussion.—DR. H. F. HANSELL said in Dr. Posey's rare case of congenital absence of the external rectus muscle, the question of binocular single vision should be considered. The operation is a brilliant success, and the power of external rotation of the eye given by the transplanted muscle is of value. It would be of interest to know whether diplopia is present, and the relation of the images to each other. The fusion center, located somewhere in the cortex, is either absent or undeveloped. Without it binocular single vision is unobtainable, and the patient is beyond the age where Worth's methods might be available.

In answer to Dr. Hansell, Dr. Posey stated that he doubted if binocular single vision could be obtained in this case, on account of the lowered degree of vision present, resulting from the high astigmatism and from the partial amblyopia from disuse.

Involvement of Ocular Muscles due to Focal Infection of the Teeth.

DR. L. WALLER DEICHLER (by invitation) read a paper, in which he described in detail the case histories and symptoms of two patients presenting muscular involvement, and one patient showing fundus changes as a result of focal infection.

CASE 1. Male, aged 65 years, suffering from vertigo. The case was diagnosed as palsy of the left superior rectus and right superior oblique with paresis of the right superior rectus, left internal rectus, right and left inferior obliques, left superior oblique and moderate impairment in the action of the right internal rectus and both external recti. X-ray showed absorption of the alveolar processes about the roots of the remaining teeth, with pyorrhea and pockets containing pus.

CASE 2. Female, aged 20 years, complaining of vertigo, occipital headaches, eye fatigue when reading and tilting of the head toward the right shoulder. Observation disclosed a progressive exophoria and a constant

right hyperphoria. A discharge of pus thru the gum from a dental abscess was followed by prompt relief of the ocular symptoms.

CASE 3. Male, aged 36 years, complaining of visual impairment. Vitreous opacities obscured a view of the right fundus. In the left fundus, blurring of the disc, edema and a granular appearance of the retina was noted. Dental X-ray showed: Pyorrhea, apical abscesses, pericementitis and a large abscess with necrotic bone about the roots of the left lower first and second molars.

Simplified Operation for Pterygium.

DR. S. LEWIS ZIEGLER stated that in operating for pterygium he had always been impressed with the fact that the growth was composed chiefly of hypertrophied subconjunctival tissue, more or less cicatricial in character and with a tendency to contract. He had for many years performed a simple operation based on this suggestion, which had been a success cosmetically and so far as he knew free from recurrence.

After severing the head with a Beer's knife and the neck with conjunctival scissors, the forceps are handed to an assistant who holds the flap taut, while the subconjunctival tissue beneath the flap is grasped by a second pair of forceps and carefully dissected off from the conjunctiva with the small scissors. The apex is then excised and the conjunctival wound closed by two sutures, which may cause overlapping of the corneal margin by the conjunctiva. This is usually clipped in several places by scissors and pushed back until the surface is smooth. Where a larger surface is bared two sets of liberating incisions are made above and below and the wound closed with three sutures. This technic of thinning of the tissues by subconjunctival excision can also be applied to other pterygium operations with considerable advantage, because it makes a thinner flap.

Retinochoroiditis with Corneal Opacity.

DR. WM. ZENTMAYER exhibited J. B., aged 25 years, presenting in O. D. an area of retinochoroidal exudation about four disc diameters by one disc diameter in size, below the macula, with a slight descemetitis and increased tension. The Wassermann and v. Pirquet were both negative. Several dental apical abscesses, enlarged tonsils and hypertrophied turbinates. Urinalysis showed a slight trace of albumin but no casts.

Fields contained an absolute scotoma, corresponding to the fundus lesion. The tonsils were removed. Ten days later, the left eye exhibited a group of pin point to pin head sized subepithelial deposits, grayish in color and occupying an area horizontally oval in the center of the cornea. A few days later the right eye showed the same condition. The dots persisted about two weeks. Subsequently there were recurrences in both eyes. At no time did they stain with fluorescein, nor did the epithelium appear to be exfoliated. They resembled somewhat superficial punctate keratitis.

Examination with the corneal slit lamp microscope made by Dr. Arthur J. Bedell, of Albany, revealed that these opacities were situated some in the anterior part of Bowman's membrane, and some in the posterior layers of the substantia propria, and in the right eye, possibly on Descemet's membrane.

The supposedly affected teeth were extracted and showed only periapical disease. The nature of the corneal condition is not clear. It is a transient relapsing one. The only etiologic factor traced in the case is a focal infection. This may have had its origin either in the tonsils or teeth, and the presence of albumin in the urine seemed to indicate that the toxin had affected not only the eyes but also the kidneys.

Whether this clinical observation is of any value in determining the etiology of this condition, it at least would seem to indicate the toxic origin of these opacities in this case. It may be recalled that Verhoeff attributes these infiltrates to the action of pyogenic dif-

fuse toxic substances acting on the nerve terminals.

Operation for Ptosis.

Dr. T. B. Holloway presented two cases showing the results of a Hess operation for ptosis. At the time these cases were placed on the program, it was his intention to present them owing to complications that had arisen following operation.

Case 1. A boy, with slight epicanthus and unilateral ptosis of the left eye. The palpebral fissure on the affected side measured 4 mm. There was marked impairment in the upward rotation of the globe. Following the operation, an abscess developed in the upper lid. It was feared for a time that the result would be a poor one, but contrary to expectations it has been excellent.

Case 2. A male adult, with unilateral ptosis of the left eye and defective upward rotation. The width of the palpebral fissure was 3 mm. A hematoma followed the insertion of the innermost suture. Subsequently the lid became red and puffy, and considerable sanguineous pus was evacuated thru the outer end of the eyebrow incision. Despite this complication, the result has been excellent and the palpebral fissure of the same width as in the other eye.

Discussion.—Dr. Wm. Campbell Posey said about a year ago Dr. Heed exhibited a case before the Section showing excellent results obtained by the Hess method in correcting ptosis. As Dr. Posey had performed this operation a number of times, also with satisfying results, and in fact was just discharging a case from the hospital in which the operation had been most successful, he gave his testimony as to the value of the procedure.

A few weeks later, however, he had an experience which caused no end of anxiety and had led him to modify his views somewhat regarding the procedure, for in attempting to raise the lid of a lady 46 years of age, which had drooped since the patient was 9 years of age, following an attack of scarlet fever, vision, and indeed the eyeball itself, were nearly lost, in consequence of a keratomalacia, or rather of an intense uveitis with some orbital involvement following the exposure of the eye after the protective covering of the lid had been removed. The operation was performed as usual, the sutures were tied, and the usual sterile vaselin dressing was applied.

Twenty-four hours after the operation, however, the patient complaining of some pain and a sticky sensation in the eye, the dressing was removed, and the cornea found to be slightly hazy in the pupillary center. All dressings were at once removed, except a slight protective one at night. The cornea was kept moistened with liquid vaselin, atropin was instilled, and the eye flushed gently three or four times a day with a boracic acid solution. Twenty-four hours later, in spite of this, the corneal haze had spread towards the periphery, and in another 24 hours the entire epithelial and subepithelial layers of the cornea were hazy. There was also some chemosis of the bulbar conjunctiva. Realizing the danger of the situation, the stitches raising the lid were removed and the lid permitted to drop down over the cornea.

Despite this, however, there was no betterment in the symptoms, indeed both the corneal haze and chemosis of the bulbar conjunctiva increased, and there was some swelling of the lids. The site of the sutures, however, showed no infection, nor was there any discharge from the conjunctiva, the ocular condition being allied to a keratitis neuroparalytica, with uveitis and mild orbital involvement. This diagnosis, was concurred in by Drs. de Schweinitz and Fox, who saw the case in consultation, and who greatly aided in their therapeutic suggestions. In addition to the local measures just outlined, constant application of ice was ordered and 10,000 units of diphtheria serum injected hypodermatically.

The local conditions gradually improved, so that the patient was discharged at the end of a month, with the eye fairly quiescent, but with a central haze of the cornea. Seen at the expiration of five months, the patient

living at a considerable distance, the corneal haze was less. Vision, however, equaled but 5/60; prior to operation it had been 5/15, this reduction being due to a slight amount of near-sighted astigmatism. Massage of the globe with yellow oxid salve and the use of hot compresses is still persisted in, in the hope of still further clearing vision. The position of the lid is much the same as it was before the operation. Perhaps on account of the cicatricial bands originated by the sutures, there is now some slight elevating power.

Dr. Wm. Zentmayer stated that Hess advised, during the period of lagophthalmos following this operation, the eye should be protected by a watch glass, after the manner of the Buller shield, as illustrated in Meller's book.

Dr. S. Lewis Ziegler suggested that in cases of corneal exposure after the Hess operation, the cornea might be protected by adjusting a small celluloid shell as a protector to fit directly over the cornea, like the ones he used in cases of corneal tattooing.

Dr. Holloway stated that following this operation, he always resorted to a dressing made up of a Ring mask in which the prominent part corresponding to the eyes had been cut away, and on the side corresponding to the operation, the opening was covered with transparent celluloid. These were the first instances in which he had any complications following this operative procedure, and it had been his original intention to present them as complicated cases, but he felt that the final result was just as good as in those cases where no complication had occurred. In each patient there was an exaggerated Graefe sign on the affected side, and in each instance the palpebral fissure became distinctly wider when the eyes were rotated strongly to the left, i. e., towards the operated side.

It was also stated that a thoro and complete dissection, almost to the margin of the lid, was important; this applied particularly to the lateral extremities. Owing to the fact that the lid sutures almost invariably cut thru, Dr. Holloway believed the use of small plates, metal or rubber, would be of service.

Flashlight Reflex of Macular Region.

Dr. P. N. K. Schwenk showed a case of search light reflex at the macula in a boy 11 years old. His right eye is nearly emmetropic, the left having a myopia of 8 diopters. The left eye has a small central white depression at the macula, which gives off a cone of light like a search-light. Frost, in his book on Fundus Oculi, says: "this phenomenon was first described by Marcus Gunn, who says it usually is associated with myopia, and called it the policeman's lantern reflex." The search-light reflex seems to Dr. Schwenk to be a better analogy, as the search-light may not have been known in Dr. Gunn's day.

Charles R. Heed, M.D.,
CLERK.

OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL AND OTO-LARYNGOLOGICAL SOCIETY.

January, 1922.

Corneal Opacities and Optic Atrophy.

Dr. T. R. Mullen presented Mr. D. C. B., age 37. Twelve years ago got a piece of steel in the left eye and had it removed under cocain anesthesia. Had influenza in October 1919 and was sick for two weeks, after which his vision was not as good as before his sickness. On April 4, 1921, he came for glasses and the vision of his right eye was 20/30, left eye 20/100, with a few small dark grayish spots in the center of the left cornea. Cylinder lenses gave him vision of a little better than 20/30 in the right eye and 20/70 in the left. On November 8, 1921, he called again and vision of his right eye was 20/100 and the left eye 20/100. Stronger cylinder lenses gave him only a little more acute vision. After dilating his pupils, the optic nerve showed some paleness, with optic atrophy in the right eye, and the corneal opacities in the left eye showed an increase in number and were darker in color. He stated that he drank considerably and smoked a great deal.

Discussion.—Dr. S. R. Gifford, after examining the case with the slit lamp,

stated that the pigment deposits were on the anterior surface of the lens and were probably deposit from the pigment epithelium of the iris due to previous iritis. Since he had had steel in the eye, however, the possibility of siderosis should be considered, altho the location of the deposit is not typical of it.

Dr. H. B. Lemere mentioned Weekers' article on siderosis bulbi, and thought the arrangement in this case reminded him of the picture in that article.

Corneal Opacity, Birth Injury?

Mary G., age 11, (school girl) came on December 9, 1921, with an inflammation of the right eye which, on examination, proved to be pneumococcus conjunctivitis. This lasted a few days, and then cleared up, and on examination, I found in the left eye a small corneal opacity with a small dark spot in the center of the pupil, and a spider web formation toward the temporal side. Vision in the right eye was 20/20, left eye 3/200. Her father states that her eye was injured by the physician at the time of her birth. She did not know until I examined her that her vision was not as good in one eye as the other.

Discussion.—Dr. J. M. Banister thinks the opacity is on the anterior part of the lens as revealed by the paralactic displacement.

Dr. S. R. Gifford says that the slit lamp shows something resembling the remains of pupillary membrane apparently resting on the anterior surface of the lens in the center of which, however, is a dark brown mass, for which he is not ready to offer any explanation. He recalls the frequency with which recent observations with the slit lamp had found remains of pupillary membrane in apparently normal eyes.

Corneal Lesions from Smallpox.

Dr. J. M. Patton reported the case of Robert R., a man of 32, recovered from smallpox seven weeks before his first appearance. One week after recovery, got an inflammation of his right eye, which had been present since. On examination, his vision was 20/200 in the right eye and 20/20 in the left. The right eye showed a typical smallpox infiltrate in the lower half of the cornea. It had been treated for about one week with atropin and hot applications. At one point, where the surface had broken down, iodin and trichloracetic had been used two or three times. During observation, the lesion had hardly changed appreciably. There was still a good deal of congestion. These cases generally run a definite course in spite of treatment.

Discussion.—Dr. S. R. Gifford described the appearance of the lesion, as seen with the slit lamp, as a dense infiltration which is in the deep layers of the cornea, but the advancing margin consists of delicate streamers of infiltration just beneath the epithelium.

Wood Alcohol Amblyopia.

Dr. Maiden reported a case of wood alcohol poisoning. The patient, 22 years, truck driver, came with vision R.E. = ability to count fingers at four feet; L.E. = ability to count fingers at three feet. His vision had gradually been failing for the last three weeks. Media clear. Right eye showed slight papillitis. Pupils dilated slightly. No history of possible etiology could be obtained. Patient did not use alcohol. Wassermann was negative with blood and spinal fluid. It was then discovered that in his work as a truck driver, he used wood alcohol in the radiator, and in cold weather this radiator steamed a great deal, filling the cab full of steam. On one day, the smell of the alcohol had been so severe that he had vomited several times. It was a few days after this that his vision began to decrease. He was put on eliminative treatment, Fisher's solution and potassium iodid. After a week or so, his vision improved to 20/30. There is still some papillitis to be seen in the right eye. The alcohol used in the radiator was tested and proved to be wood alcohol. The patient's urine showed the presence of formic acid, so that the case was considered as one of toxic amblyopia from wood alcohol.

Discussion.—Dr. Patton mentioned having seen one case in a woman, who

had been polishing a stove with polish containing wood alcohol, another who had been varnishing in a closed room, and another in a man who had been priming a stationary engine under a hood with wood alcohol.

Some Third Nerve Reflexes.

Dr. J. P. Williams of Lincoln, read the paper published on page 642.

Discussion.—Dr. Teal expressed himself as being particularly interested in cases of vertical imbalance. Most of us can recall the time when anyone who used prisms in a prescription was looked down on by the profession. This is no longer true. Dr. Dean in his paper presented before the Academy, has proved the value of prisms by a large series of cases in which they had been prescribed with entire relief of symptoms. He reports the case of a former associate who wore in his prescription a nine degree prism base vertical, and thirteen base out with perfect relief of symptoms. At the meeting of the Academy, he noticed how many prominent oculists agreed with Dr. Dean in the use of prisms. He believes it is as important to relieve latent hyperphoria with prisms as it is to relieve latent hyperopia with spheres.

Dr. Banister was especially interested in the subject of scintillating scotoma, as he himself had suffered with it for years, and this is the first paper he has seen on the subject for years. He suggests that scintillating scotoma is due to toxic absorption, and the headaches due to the spasm of the cerebral arteries. During the attacks, he would have complete aphasia and would have a right sided hemianopsia. After such an attack, he always found that his stools were light colored. Spirits of ammonia would relieve the immediate symptoms, and a cathartic would prevent their recurrence until some later time, when he became constipated again. He believes it is absorption of the toxins which causes the spasm of the cerebral arteries. His two sons had similar symptoms with similar relation to constipation.

Dr. Patton: Dr. Williams has given us a very valuable paper on a subject to which we have not paid as much attention as it deserves. It has been our custom to emphasize the correction of refraction and of toxemias more than defective muscles.

Dr. Lemere believes that Dr. Williams has covered the subject in a unique way, in a case of hyperphoria which had a sudden attack of dizziness with falling, and which subsequent history proved to be due to muscular defect. This case alone would make the paper valuable as a reference. We have all seen reflexes from bright light in some degree, but have not followed their history closely enough to get the etiology. He suggests the value of remembering this in cities, such as Omaha, where the down town district is in the eastern part and the residence part in the west, necessitating driving against the sun both morning and evening.

Dr. Bushman said the paper had confirmed his opinion with regard to the importance of the effect of strong light. We have all seen cases of people working in offices who show more symptoms than refractive error, and a careful questioning often discloses a history of improper lighting conditions. The vision in these cases by refraction may actually increase symptoms instead of relieving them. He believes the use of prisms has been overlooked. He recently heard quite a prominent oculist say that he did not correct muscular defects, only errors of refraction. His partner, Dr. Bryant, wore a 20 degree prism for esophoria constantly. This relieved him from the symptoms and the esophoria gradually cleared, so that the prisms were no longer needed.

Dr. Banister was especially glad to hear the lively discussion on muscular defects. A paper read at Denver disclosed the fact that very few people have yet considered the subject of muscular error of any importance. He thinks the doctor's work with prisms splendid. He differs with Dr. Williams in that when the muscular defect is more than six degrees, he operates by a tuck. In cases of defect of the vertical muscles, he does not use prisms for marked lateral defects. He

thinks such use of prisms actually increase the muscular error. The defective muscle needs exercise with the prisms, and by the use of prisms of increasing strengths, many cases are relieved. If this is ineffective, he does a tucking to get the required amount of convergence. He does the same in cases of esophoria if over four degrees.

Dr. Maiden stated that he has seen Dr. Dean's work, and that he does obtain results by as weak a prism as one degree base in. He tries in all cases to check up on the muscular errors with prisms. There is a good deal of difference in individual patients, some not standing even a weak prism, and others a rather strong one without discomfort.

Dr. Woodward emphasizes the importance of excessive light stimuli. He had a patient who was relieved of very severe symptoms by simply decreasing the strength of the electric light bulb which she used for reading.

Dr. Williams, in closing, believes that toxemia is an important factor in these cases but light influences are often hard to detect, especially in school children, and these may often be the real cause of the symptoms. He reports the case of a man of 38, who had scintillating scotoma, who was relieved by giving him a plus one for reading. Many cases can bring on symptoms at will by looking at a strong light. He remembers one man who had to drive two hundred miles southward against the sun. During the drive, he had severe symptoms, whereas on the return drive with the light at his back, there were no symptoms at all. The attacks he had been having were relieved entirely by using a shaded light.

S. R. Gifford,
RECORDING SECRETARY.

MEMPHIS SOCIETY OF OPHTHALMOLOGY.

March 21, 1922.

An Unusual Vitreous Opacity.

Dr. A. C. Lewis reported the case of J. P., a negro man aged 29, who came to the O. P. D. eye clinic several weeks ago complaining of dimness of vision in the right eye.

No history of injury, but his eyesight has been gradually getting dim in this eye for 2 or 3 months. Vision O.D. 20/50; O.S. 20/20. Muscles and fields normal. Pupillary actions normal in both eyes. Wassermann negative, urinalyses negative.

Ophthalmoscopic Examinations.—Directly over the optic disc, with the addition of a plus 4.00 lens to the one used in examining the disc, we see a thin oval opacity of bluish color 2x3 mm. in size. It is seen to be thin enough for some light to pass thru. The nasal rim of the opacity is slightly denser than the remainder of it.

Discussion.—Dr. J. D. Stanford thinks the opacities are on the posterior capsule. There is something forward and below, which appears to be a retinitis proliferans.

Dr. E. C. Ellett said that this seemed to be more like hyaloid remains. He does not think it is on the posterior capsule. It appears to be more of a retinal detachment.

Sympathetic Ophthalmia.

Dr. E. C. Ellett reported a case of probable sympathetic ophthalmia. The left eye of a young woman was cut with glass on Dec. 28, 1921, the cornea being cut across. It was covered with a conjunctival flap. On Jan. 12th, the eye was soft, vision zero and the scar was depressed. The eye was removed and a glass ball put in Tenon's capsule. About Jan. 28th, O.D. become a little blurred. Feb. 1st, vision which had been 20/20 was 20/70, but 20/20 with —1. The eye was normal. Feb. 2nd it required —3 to bring vision to 20/20, and the retina was edematous. The glass ball was removed. Slight ciliary injection, a mild iritis and retinal detachment developed. The eye is soft with vision perception of light. The treatment was energetic; sweats, mercury, salicylates, atropin, hot applications, rest in bed and removal of all possible sources of focal infection.

Glaucoma.

Dr. Ellett reported the case of a woman, aged 59, who had trachoma for 27 years and for a month pain and poor

vision. There were all the symptoms of glaucoma. Tension O.D. 66, O.S. 72. A Lagrange operation was done in the right and trephine on the left eye. After two months the tension was normal in O.D. and 34 in O.S., and vision had risen from 1/200 in each eye to 20/70 and 20/100.

Mrs. U., aged 78, was seen in May, 1917. Her vision was poor. In O.D. —20/25, and J. 10, brought to normal with glasses. O.S. vision in temporal field only. Pupils, O.D. 4 mm. and movable; O.S. 5 1/2 mm. and fixed. Fields narrowed. T., O.D. 55, O.S. 50 (McLean). The right nerve was probably slightly cupped, the left distinctly so. In both eyes there were yellowish dots all over the posterior pole, which might be colloid deposits on the lamina vitrea, or might be retinitis circinata. She has two daughters whose eyes show the same thing, and on one of whom he has operated both eyes for chronic glaucoma. The fundus condition has been diagnosed choroiditis in the mother and one daughter, and albuminuric retinitis in the other daughter.

Left eye. Eserin was ordered and used for two years. In October, 1919, she had acute glaucoma in the eye and Dr. E. removed it.

Right eye. In spite of the constant use of miotics the tension in this eye remained high. The field contracted. The lens is cloudy, and the refraction has changed on that account to—2.50, with which she gets 20/30. On account of the contracting field, an operation was advised.

On Dec. 29, 1921, a Lagrange operation was done. The surgical result is very good. The filtration area seems to be limited by the scar outlining the conjunctival flap, so that there is quite a firm mass adjoining the limbus above. The vision is now 20/100. The tension is normal.

Complicated Cataract.

Dr. E. C. Ellett reported the case of Mrs. D., seen in August, 1904, then aged 45. Her vision was poor and she had a marked convergence of the left eye, of which she did not seem to be aware. The cornea was half hidden by the inner canthus, and she could not turn the eye out beyond the median line. The family thought this trouble had been present for about 5 years, and was getting worse. There were some vitreous opacities and quite a high myopia. Vision was 20/60 in each eye with—12.00 O.D. and—13.00 O.S. She did not have binocular vision. In 1907 the vision was 20/100, not improved by glasses. Both eyes showed opacities in the lens and vitreous. No history of syphilis.

For cosmetic purposes a tenotomy of the left internus and advancement of the left externus was done on the left eye, with considerable improvement. She was given mixed treatment.

Dr. E. did not see her again for 13 years, i. e. in 1920. The vision in the right eye had continued to fail, and in 1915 she had a cataract extraction on this eye, followed by two capsulotomies. The eye showed a coloboma upward, a considerable membranous opacity, marked convergent squint and inability to turn the eye out beyond the median line. Vision light perception.

The left eye, on which the muscle operation had been done, was straight, but could not be moved outward. There was a mature black cataract, and vision was equal to moving objects. In July, 1920, a simple extraction was done on this eye. On grasping the capsule with forceps the lens was dislocated, but could not be extracted in the grasp of the forceps, or with pressure, so it was delivered with a wire loop. There was a loss of some very fluid vitreous and slight collapse of the ball. The lens, which was a dark amber with an almost black nucleus, was delivered in the capsule.

After a normal course for 8 days, the eye developed an intense chemosis of the conjunctiva, and watered profusely, the vision was poor and the reflex dim. On atropin, aspirin, ung. hydrarg. and hot applications, the eye cleared some, and she went home two weeks after the operation. Dense vitreous opacities could be made out. A month later she returned. The vision was very dim. the eye red, soft and shrunken. This condition had come on suddenly and

without apparent cause. It was so soft that it wrinkled from the pull of the muscles when moved. Dr. Stanford, who saw her then, thought she had total retinal detachment. A week's treatment by rest, atropin and mercurial innunctions resulted in a slight pink reflex to the nasal side. Two weeks later a good reflex could be obtained in every direction and a few vessels could be seen. There were many vitreous opacities. No test of the vision was made, but she saw very little, and we did not want to discourage her by calling attention to how little. She then went home on mixed treatment in Sept. 1920.

She kept this up for a year and returned on Dec. 8th, 1921. The eye looks perfect, surgically. The ball is full and white, with a round central pupil and fair motion. With—10. she sees 20/200. The field is not noticeably contracted, the tension is normal and there are a few vitreous opacities. The eye ground shows normal nerve and vessels. The retinal pigment is extensively absorbed, and heaped in places, sometimes on the vessels, as in retinitis pigmentosa. The restoration of this eye appears to border on the miraculous.

Injured Eyeballs.

Dr. E. C. Ellett reported on four cases: J. F. B., aged 35, who was shot in O.D. with No. 6 shot on Jan. 27, 1922. Wound in cornea above center. X-ray showed shot 32 mm. back of cornea. Enucleated eye Feb. 26th for iridocyclitis. Shot was found behind the ball. Specimen showed exudate in anterior chamber and vitreous, cataract and detached retina.

2. L. F., aged 16. Hurt right eye by a fall when a baby. Cornea small, opaque and distorted. Enucleated Feb. 27th, 1922. Specimen shows anterior chamber full of an organized mass of tissue passing thru the pupil. Pigmentation of fundus and cupping of disc. Angles of anterior chamber obliterated.

3. E. L., aged 10. Examined three weeks after injury by a wad of paper with a pin in it. The eye was red and painful, pupil dilated and a yellow mass visible in the vitreous. Specimen shows much vitreous and subretinal exudate, and total retinal detachment, some hemorrhage.

W. H., aged 32. Right eye blind for 8 years. No apparent cause. Inflamed and painful, 6 days. Eye acutely inflamed, pupil dilated, tension 32 Hg. and 60. Capsule covered with exudate and iris discolored. Ball tender, no F. B. Enucleated March 7th. Lens shrunken and very dark nucleus. Angle of anterior chamber closed.

S. S. Evans,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

March 20, 1922.

Dr. Frank Brawley, in the chair.

Melanoma of Choroid.

Dr. George F. Suker presented a case which was described by Dr. J. C. Stein.

A school boy, aged 14, entered Cook County Hospital on March 6, 1922, complaining of crossed eyes. About seven years ago the patient recovered from diphtheria, after which it was noted that his left eye was turned in. Some months later he was operated upon for the convergence of the left eye, but later the strabismus recurred. The family history and physical examination were negative. No pigmentary spots were noted anywhere on the surface of the body. Right, vision 0.6; left, 10/200; convergent deviation of the left eye 30°; secondary deviation equal to primary deviation. Conjunctiva, cornea, iris, lens, and vitreous essentially negative, and the pupil reactions were normal.

Fundi: Right eye; the optic disc was normal. Two and one-half disc diameters above it, and slightly temporal was seen a definitely circumscribed area about twice the size of the optic disc. The nasal side of this area was just temporal to an imaginary vertical line touching the temporal side of the optic disc. The patch was rather sharply defined, resembled the human heart in shape and was apparently situated in the choroid. The retina over

it was not raised or depressed. The superior temporal vein coursed over this and divided in its inferior temporal quadrant; one branch passing directly temporal, the other superior and temporal. Several small arterial twigs arising from a branch of the superior temporal artery passed over this circumscribed area. No change in the level of these vessels was noted. This sharply circumscribed smooth area appeared of slate (blue ointment) color, somewhat stippled and somewhat thinner in a few places, allowing the choroidal circulatory system to show thru. This condition was especially noted in the superior nasal portion of this area, where the margin was rather uneven and feathered.

Left eye. Essentially negative, except for a vertical elliptical disc. Scotoma mapping was unsatisfactory.

Hospital Diagnosis: Melanoma of the choroid (nevus—pigmented mole) of the right eye; left concomitant convergent strabismus with amblyopia ex anopsia.

Pulsating Exophthalmos.

Dr. Suker also presented a case described by Dr. Cottle.—This patient entered Cook County Hospital, Feb. 20, 1922, with the history that he had been shot thru the left cheek on January 3, 1922, the bullet passing thru the cranial cavity. Two attempts had been made in another hospital to remove the bullet. Five days following the injury, the left eye began to swell, the lids became edematous, and in the course of the ensuing week he lost all vision and movement. He stated that he could feel "a pumping in his eye" and "a roaring in the left ear." He was unable to open the mouth fully, owing to fracture of the left ascending ramus of the mandible.

Examination showed the lids markedly edematous and pendulous, forming a swelling which rose over an inch from the surface, and involved an area 2 1/4 inches horizontally. The inner margin of the swelling was formed by the nose, while temporalward, it reached the margin of the orbit. The superior orbital crest limited the swelling superiorly and inferiorly a marked bagging of the lids was present. The swelling was soft and doughy, and not tender to the touch. Retraction of the lids revealed the conjunctiva to be swollen, red, soft and succulent. The eye was proptosed at least a centimeter and a half, and immobile. The greater part of the cornea was replaced by a disciform, yellowish-white, irregular, mass, surrounded by a clouded rim of cornea, 2 mm. wide. This was insensitive.

A distinct pulsation could be felt over the whole eye, and a distinct to and fro bruit, synchronous with the heart beat, was heard not only over the eye, but over the whole cranium, being especially loud on the left side and not affected much by the position of the head, but was louder with the head held low. Pressure over the left common carotid artery for ten minutes reduced the edema of the lids very markedly. The central and posterior walls of the cartilaginous portion of the left external auditory canal showed recently healed irregular wounds, about 0.8 in diameter. In the left ear the whispered voice was heard only on contact, and the spoken voice was materially reduced. The Weber was not definitely lateralized; the Rinne was negative. X-ray examination revealed the bullet fragments in the region of the mastoid, but none elsewhere. There was no X-ray evidence of basal skull fracture.

On March 3, 1922, the left common carotid artery was ligated with two braided silk sutures a centimeter apart. The following morning the patient was in excellent spirits. He no longer felt the throbbing nor felt the ocular pulsation. Both radial pulses were good and equal. The swelling of the lids and proptosis were measurably diminished. On March 12, a leech was applied to the upper lid with some beneficial effect. About this time, very close observation revealed the fact that only in the prone position some pulsation was still present, as was also the murmur over the cranium. However, the swelling gradually became less; and the eye which was previously fixed and anesthetic became somewhat movable and sensitive. Hearing was also

slightly improved (spoken voice at 15 feet).

It was thought that the pulsating exophthalmos was the result of an aneurysm of the internal carotid into the cavernous sinus, the sequel of a basal skull fracture, which in turn was due to a gunshot injury of the temporosphenoidal region. Because pressure relieved the symptoms and produced no dizziness or other cerebral manifestations, the indication was to tie the common carotid, not only for the local eye condition, but also as a prophylactic measure against intracranial hemorrhage and involvement of the right cavernous sinus. That the pulsation and the murmur were still faintly present when the patient was in the prone position is evidence that the collateral circulation is adequate and compensatory in the left cerebral hemisphere.

Discussion.—Dr. George F. Suker thought the interesting feature of the first case was the accidental finding of the melanoma of the choroid in the course of an examination for refraction and strabismus. Melanoma of the choroid was exceedingly rare. The etiology was that of the ordinary mole as it belonged to the class of moles. Because of this etiologic factor there was, as in every mole, an inherent malignancy, but not necessarily an active one. Whether this boy might receive a blow upon the eye which would transform this latency into an active malignancy was questionable. An active inflammatory process in the neighboring choroid could excite this latency. The peculiar mulberry color was another characteristic feature. Because of the stippled appearance of the growth there was a little more than the ordinary tendency to malignancy, the same being true of moles elsewhere.

The pulsating exophthalmos patient was operated upon for an orbital abscess at another hospital. An interesting feature was that it was a true aneurysm of the internal carotid artery, and that every possible vessel was pulsating. The entire venous supply of the orbit and adnexa was transformed into an arterial supply. There was not only the passive congestion that might have been in the venules, but an active congestion because of the arterial circulation. Whether it would become necessary to tie the common carotid on the other side was a question. This had been done in some instances, but he doubted the advisability of such a step. Continuous pressure upon the common carotid had never been of any permanent value, nor had the injection of agar or gelatin into the cavernous sinus. The ligation of any of the orbital vessels in this case was absolutely contraindicated as the orbital vessels were not the site of the aneurysm.

The patient had what was a true trophic keratitis, and Dr. Suker believed that the only real trophic keratitis was from a complete mechanical obstruction of the fifth nerve and the cavernous plexus of the sympathetic. Loss of sensation in every branch of the fifth nerve would give a pseudotrophic appearance. What the eventual outcome of the case would be, he did not know, but he felt that the return of the circulation and the minute bruit was a distinct sign that the left hemisphere of the brain received its necessary blood supply. Up to the present time, no cerebric manifestations followed the ligation of the common carotid artery.

Weak Atropin Solution for Asthenopia.

Dr. William E. Gamble stated that eye and *headache* resulting from induced spasm of the sphincter iridis and ciliary muscle by the instillation of eserin was a frequent observation in his work, the discomfort usually being relatively slight, but in many cases much pain was produced. Recently one instillation of a 2 per cent solution in the eye of a physician produced so much eye pain, that he had to be sent home in a cab and did not recover from the pain until the next morning. Part of the discomfort experienced in passing from a dark room into bright daylight was produced by the rapidly contracting pupils.

While with properly fitting glasses, most persons could endure the accom-

modative spasm of their ciliary muscle in doing close work with but little pain or fatigue, there seemed to be an increasing number of those who could not. He thought that the rational treatment in these cases was to give less work to the tired eyes, to increase the nutrition of the patient and otherwise build up the general health. Unfortunately, many of them could not quit work. Temporary rest might be given by instilling a high dilution of atropin which should not dilate the pupil enough to annoy the patient and should not interfere with close work. He had found 1/200 of a grain of sulphat of atropin to an ounce of water dropped into the eye Saturday afternoons, for those who were doing close work the rest of the week, to give much relief. If used oftener, the results were better.

Dr. Gamble then narrated the history of three illustrative cases. It was not his claim that this treatment was anything but temporary, until change of conditions or general treatment gave relief. He was not sure but that in many cases an even weaker solution might be indicated. In some cases a 1/100 gr. to the ounce solution was necessary to give relief. The strength and frequency of its use varied in different individuals. This particular solution was offered as a guide. Carelessness in filling the prescription should be carefully guarded against.

It would seem that the use of it was indicated more particularly between the ages of 18 and 35 years. In younger persons, the stress and strain of life had not yet produced neuroses; in the older, the pupil becomes more sluggish with advancing years, and the accommodation less with the increasing sclerosis of the lens. He was of the opinion that in many hysteric patients, the photophobia was of the trigeminal and not of the retinal type. The mechanical pressure on the nerve endings in and about the sphincter iridis was the source of the discomfort. It was rare, in his experience, to have seen indications for the use of this solution in men; practically all of the patients had been young women. He reported his experience with this drug, with the hope that indications for its use would be more carefully worked out by others than he had been able to do.

Discussion.—Dr. Harry Gradle asked Dr. Gamble if he had measured the influence this 1:100,000 solution had on accommodation, and whether he got the influence upon the sphincter of the iris or upon the ciliary muscle, endeavoring in that way to differentiate the origin of the pain due to the spasm.

Dr. Gamble, in closing, stated that he used 1/200 grain of atropin to the ounce of water as his weakest solution, and also used 1/100 of a grain as a maximum solution in this work.

He was interested in the question of Dr. Gradle. The second case to which he referred did not have an exaggerated contraction of the pupil, but had fatigue; and he thought in that case it was probably a hyperesthesia of the ciliary muscle. But in the other two cases, particularly the last one, the thing that struck him first was the way the pupil came down. It was more like the contraction found in a child. The patient complained of photophobia and wore No. 3 smoked glasses without relief. It was impossible for her to go out in an automobile, but by giving her 1/200 grain of atropin solution that symptom disappeared and she no longer complained. Consequently, he reached the conclusion that the greatest trouble with her was a spasm of the sphincter iridis pressing upon the nerves of the iris. It was interesting to give atropin to relieve these cases.

Basic Visual Fields in Lesions of Optic Pathway.

Dr. George F. Suker illustrated his talk on the subject with graphic fields (40 odd sets) and the discussion was limited to lesions of the nerve, crus, chiasm, tract, primary centers, optic radiations and cortex. The value of the field was many fold. By taking the field very accurately, many things could be ascertained which were of great assistance in the differential diagnosis, particularly between functional and organic lesions. It was possible to distinguish between cerebral and ocular pathway lesions. In some in-

stances, where the ophthalmoscopic examination was absolutely negative in every way, the field often gave a clue as to where the lesion was, particularly in amblyopia.

The manner of taking the field was very important, and the patients' facial contour must be considered. A narrow face with shallow temples, hollow cheek bones, raised brow and prominent eye would give a larger field, which was normal for that individual, than for one with a sunken eye and high cheek bones and large nose. The size of the test disc was also of value; the larger the disc, the larger the field, and vice versa for the normal individual. The field was always larger from the center toward the periphery than from the periphery toward the center, varying about five degrees in the normal individual.

In taking the color visions it was absolutely essential that the color be definitely seen not reddish, but red; not greenish, but green—in other words, color saturation. As one moved the color discs from the center they would change. Blue would often appear white, and green yellow. In dealing with retinal fatigue it was always desirable not to have the eye exposed too long; encourage frequent winking. The time of day and the light should also be considered. Dr. Suker believed in taking the field with good daylight, preferably north light; and did not consider it wise to take the field with any electric light or with a perimeter with an electric light attachment. The color and form perception of objects in north daylight were entirely different from that with electric light.

The larger the pupil, the larger the field; the longer the antero-posterior diameter of the eye, the smaller the field; therefore, the higher the myopia, the smaller the field. The patient should not be tried too long at one sitting. It was also necessary to consider the vertical palpebral aperture, as it influenced the height and the depth of the field. The field for form and color might vary greatly. It varied little for form in any normal individual. but the color varied greatly.

The visual cortex did not serve in perception of light only, but of color and form. The ability of the patient to recognize "C" or "A" or "B" in any particular part of a field, was essential in determining which part of the visual cortex was involved. This was an idea that needed further investigation and might lead to new facts thru taking visual fields.

One chart showed the combined visual field of the two eyes. It was of no diagnostic value and only showed that the combined was larger than the monocular. Behind the chiasm all lesions would present the same kind of a field, whether it was in the optic chiasm, or in the cuneus, or the tract or radiations, with this difference, that the further behind one got and the nearer the cortex, the less observable was the lesion to the patient, unless it became absolutely complete; and the greater was their symmetry.

Dr. Suker exhibited charts of conditions met with in military service, charts showing lesions of the optic tract and of the cuneus—unilateral and bilateral. He was most interested in the lesion of the cuneus, for the reason that the various interpretations of sight centered around there. The cuneus had nothing to do with the perception of form. A characteristic of the cuneus lesions was that they were very symmetric, more so than other lesions. In many of these cases the patients recovered to a large extent, and never recognized their lesions at all, until their attention was directed to them.

Fields did not give any further information than the location of the lesions. Lesions of the cuneus would not only give visual field defects, but would often have associated with them interferences with speech and possibly hearing. There might be complete blindness in the two eyes and the pupillary action still be present, owing to the fact that the optic nerve fibers were divided into two, one sensory and the other motor for accommodation and iris reactions.

The essential factor in taking a visual field was accuracy. A painstaking field would give the exact location

ot the lesion, depending upon the portion or portions of each field involved. If the lesions were behind the chiasm and optic nerve, there often would be general symptoms associated with them. There could be no bilateral involvement unless the lesion was in the chiasm, the tract, radiations or in the cuneus lobe, unless the lesion was bilateral.

Discussion.—Dr. J. F. Burkholder thought there was little to be said in criticism, because he presumed the findings had been corroborated postmortem. The association of fibers should be remembered. Dr. Suker had mentioned the association of the eyes thru the anterior fibers of the chiasm. Another tract had been worked out from the physiologic standpoint, which he mentioned six or seven years ago, the posterior portion of the claustrum. One could get an association between the visual centers of the two occipital lobes, particularly the cuneus, thru the posterior fibers of the claustrum, and that gave an association that would account for some of the visual conditions.

The recognition of letters for taking visual fields had escaped him, but it was a good point. Another difficulty which should be made clear was the tracing of the nerve fibers from the retina back to the cuneus. If Parsons was wrong and Fuchs right, there were three series of neurons in the retina. The first series would be the rods and cones; the second would be the bipolar cells, and the third series would be the large ganglion cells, the axons of which passed out of the eyeball, forming the optic nerve, which ran backward to the chiasm, where a marked rearrangement of the nerve fibers took place. From the chiasm these same neurons were carried back, forming the optic tracts, the fibers of which were distributed to the pulvinar, the external geniculate, and the anterior pair of the corpora quadrigemina, and ended there.

There was no continuity of tissue between the termination of the fibers of the optic nerve in the pulvinar and the parts that lay behind. A fourth series of neurons lay in the pulvinar and external geniculate, and a few in the anterior pair of the quadrigemina. The axons of this fourth series of neurons ran backward, forming a large tract or bundle which lay in the white matter of the occipital lobe. This bundle was called the optic radiation, the fibers of which were distributed to the mesial surface of the occipital lobe around the calcarine fissure, and to the angular gyrus of the parietal lobe, which arched around the postterminal extremity to the superior temporal sulcus. The letter and word centers lay in the cuneus, which lay superior to the calcarine fissure. The center for figures lay in the angular gyrus.

As the essayist had stated, there were two classes of fibers in the optic radiations which carried impulses to and from the cerebral cortex. But he was of the opinion that these had nothing to do with the light reflex for the pupil. The fibers that carried the reflex for the pupil left the optic tract before the visual fibers reached the pulvinar and the genicular, and passed downward to the third nucleus, and from this nucleus the fibers were carried to the sphincter pupillae. This formed the true and only pupil reflex arc of the higher vertebræs.

Dr. M. Z. Albro said that two years ago, a prominent physician in the city had a hemianopsia in the right field, and in taking his vision he was interested in the fact that he could not recognize letters, but in watching him he found him looking at the chart and making the form of a letter with his finger and then pronouncing the letter. This might give an idea of another road by which he reached the right recognition.

Dr. Michael Goldenburg asked if it was possible to have a unilateral loss of recognition of letters.

Dr. Suker, in closing, said that the primitive function of the eye was the nerve perception of light. All other recognition was developmental and the result of education, and was due to the associated fibers around the cuneus, the gyrus and the occipitoparietal lobes. There was no such thing as a unilateral recognition of letters until there was complete blindness in one eye. A unilateral inability to recognize a letter could not exist when both eyes

could function, because it was a cortical lesion and the cortex had association fibers because of the claustrum joining the two eyes, as Dr. Burkholder had said.

Regarding the pupillary reaction fibers and the optic nerve, the median tract of the optic nerve is the motor portion, and that goes to the anterior corpus quadrigeminum, from there to the nucleus of the third nerve, then to the lenticular nucleus and then to the ciliary body and iris. They have no function of sight, just a motor function, and this is true of all the lower animals, whether there is complete decussation or not. The field is larger on the nasal than on the temporal side.

Anatomically the eye is located a little divergent in the socket, bringing the nasal side a little farther forward, and therefore, a little divergent. It had been demonstrated very well by Schaefer and Sanger Brown, that there was an association between the cuneus, the pulvinar, the geniculate body and the optic thalamus. Otherwise there could not be the field symmetry in the two eyes. Coming back to the chiasm, there could not be any lesion without involving the two eyes. This is the crux of the whole question, and the nearer one got to the crus of the chiasm the more likely was there to be the type of lesion which could involve one eye more than the other.

ROBERT VON DER HEYDT,
Corresponding Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

DR. HILLIARD WOOD, President.

March 20, 1922.

Melanosis of Cornea.

DR. HERSCHEL EZELL reported the case of C. H. S., aet. 60, male, who consulted him February 20, 1922, on account of poor vision. There was a burning feeling about the eyes with ocular tire and headache. He had been near sighted since childhood, and had worn the last pair of glasses fifteen years. The patient had been under an enormous strain for years, getting but little rest, and at all times working under great pressure. The patient is a bookkeeper and clerk. Health has been good, except he has had most of the diseases of childhood.

Fig. 1.—Melanosis of cornea. Ezell's case.

Conjunctivitis of right eye, which cleared up in three days after using boric acid solution. The corneæ of both eyes present areas of pigmentation, running vertically thru their centers. The pigmentation is most dense opposite the pupils, but traverses the diameter of the cornea. To the right and left of the pigmentation the cornea is clear. The pupils are normal in size and react equally and freely to light and convergence stimuli. Ophthalmoscope shows fundi normal, except the myopia. Visual fields slightly contracted above and below. Color sense normal. R.—14.00 D. S V.=

20/70. L.—15.00 D. S. V.—20/70. To this correction +4.00 D. Sph. was added for reading. See Fig. 1, p. 663.

From the history and the physical findings, there is every reason to believe that this is a case of congenital melanosis of the cornea. The accompanying drawing is a good reproduction of the condition.

Melanosis of the cornea, or pigmentation of the cornea, is either congenital or acquired. The form and location of the pigmented area is quite different in the two types. If the condition is congenital, the pigmentation appears in the form of a vertically oval area of brownish color, affecting the deepest layers of the middle portion of the cornea. The cornea looks as tho it had been painted with brown or black paint vertically thru its central part. The condition is usually symmetric in both eyes. It is more common in women than in men.

In acquired melanosis, the pigmentation does not assume any special form. The cornea may be pigmented in a small area, or entirely covered. The posterior endothelial layer may be pigmented, or the pigment may penetrate into the substance of the cornea.

Congenital melanosis is due to an abnormal development of the uveal tract. Some authors attribute it to multiple sclerosis, as it has been observed in several such cases. Salus attributes the condition to this cause. "Senn, commenting upon a case that was reported by Salus, calls attention to the fact that the patient was a dyer, and referred to an article which he himself published in 1897, describing eighteen cases occurring in dyers using anilin colors, in which the cornea was stained a sepia brown."

According to Yamaguchi, primary melanosis of the cornea is very rare, and so far has not been examined microscopically.

He gives a microscopic description of two pig eyes, which exhibited an intense pigmentation of the central portion of the cornea. "The pigment was exclusively localized in the epithelial layer, chiefly in the basal cells. He assumes a metabolic formation of pigment from the albuminoid bodies of the cells, since by the negative reaction to iron, the hematogenous origin of the pigment could be excluded. The corneal epithelium acquired exceptionally the specific faculty of the cells to produce and accumulate pigment, which is congenitally inherent in the epithelium of the limbus."

In acquired melanosis, a prolapsed anterior chamber, wrinkling or folding of Descemet's membrane, or loss of endothelium, are predisposing factors. It may develop when the anterior chamber has been emptied for a long while, and the iris remains in contact with the cornea. The iridic pigment is then deposited upon the posterior surface of the cornea. Pigmentation has been noted upon the posterior surface of the cornea following operations, in which cases the pigment was found near the scars. Oeller has observed this and thinks that it comes from the iris, and that its deposition is due to the direction of the flow of the lymph current toward the wound until it heals.

A case of corneal pigmentation has been reported by Wells, which was due to hemorrhage into the anterior chamber following sclerotomy for secondary glaucoma. The color was at first greenish, but turned gray at the end of a year. After three years the eye was enucleated and examined microscopically, showing pigmentation in the anterior fifth of the corneal stroma. Rounded bodies were found somewhat larger than bacteria, which stained with eosin. Staining of the cornea has also been noted following iridocyclitis, chronic cyclitis, and detachment of the retina.

Trauma seems to be a very frequent cause of corneal pigmentation. Cases have been reported by Cantonnet, Jacub and others. The case reported by Cantonnet did not show pigmentation in the periphery, which is the rule. Sauvineau, in discussing this case, suggested that the bleeding from the ciliary body may have pressed the root of the iris forward against the cornea, and so prevented staining the cornea at this point.

Chemicals, viz., anilin dyes, silver nitrat, ochre and argyrol, are respons-

ible for a great many cases of corneal pigmentation. Among 106 self inflicted injuries to the eye done to escape conscription, Wasiutinsky saw 44 cases of artificial coloring of the cornea. By experimenting upon animals with a large number of chemicals, he concluded that only silver nitrat and ochre left such spots. Higgins reports a case in which argyrol was used following an incised wound of the cornea, which produced a brown stain, which was visible six months later. Sodium chlorid should not be used to neutralize silver nitrat, as it is liable to cause a deposit of silver salt. (Marquez.) The same author recommends the use of a 5% solution of sodium hyposulphit to remove such deposits.

1. From a review of the literature it is manifest that primary melanosis of the cornea is rare. 2. That hemorrhage is by far the most common cause of acquired melanosis. 3. The case herein reported is the first case on record accompanying a high degree of myopia, so far as he is able to determine.

Bilateral Traumatic Dislocation of Lens.

Dr. E. B. Cayce presented the case of Mr. L. P. S., aet. 46, farmer, who since early life had been myopic, but with —13.00 D.S. for each eye, had fair vision, both for distance and near.

November 28, 1921, he was struck above the eyes by a fist; both eyes were bruised. For a while he was almost blind, but recovered some vision in a few days. First seen January 26, 1922. At that time the right eye showed perception of hand movements at two feet; and the left eye was able to count fingers at twelve inches. In each eye, at the upper corneoscleral junction, was a mass of bulging scar tissue, as if an incision at the upper corneoscleral junction had been made, and the wound was bulging forward. The pupil of each eye was displaced upward, having the appearance as if an iridectomy had been done above. Each lens was dislocated forward and upward, one edge of the lens projecting forward thru the pupil, and the other edge projecting backward; the plane of the lens being more or less horizontal, and pushing the upper portion of the iris upward against the inner side of the corneoscleral wound.

Dr. Cayce decided the wisest course to pursue was to deliver the lens in the right eye, before attempting any surgical procedure in the left, or better eye. January 28, after the method of Fox, with incision well forward into the cornea, the lens was removed with very slight loss of vitreous. Healing was uneventful. At the present time, with +11.00 D. Sph., right eye has vision of 20/200, and with added correction for near work, vision is Jaeger No. 7. The scar tissue in the upper corneal region is slowly clearing up, and as the corneal curvature assumes more and more its normal shape, it is hoped the vision will still further improve. As the pupil is displaced upward, the lower margin of the iris obstructing central vision, Dr. Cayce contemplates doing an operation as suggested by Ziegler, i. e., make a window in the iris to give central vision.

Dr. Cayce said that while the patient was perfectly willing to have both lenses removed, yet he thought best to first operate on the worse eye, and see what degree of success could be obtained, before removing the opposite lens. The question in his mind is: With the degree of vision which the patient now has, should the lens be removed from the left eye?

Discussion.—Dr. Hilliard Wood inquired if there had been a rupture of the sclera above in each eye by the blow, at the upper corneoscleral margin; and if so, did this account for the appearance of the left eye, which looked as if it had had an iridectomy above. He thought the left lens should be removed. Inasmuch as Dr. Cayce removed the lens from the right eye, which was the worse eye, and improved the vision by so doing, he could see no reason why the vision of the left eye should not be improved in the same manner. Besides, if the lens is not removed, secondary glaucoma will likely develop later.

Dr. Cayce said that no operation whatever had been done on the left

eye, but remarked that it looked as if the blow had attempted to do a cataract operation. His idea was that the cornea had been ruptured and scar tissue formed. In his opinion the iris was not ruptured, but pressure of the lens had held it in position until it was atrophic.

WASHINGTON INTERNATIONAL CONGRESS.

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Wednesday, April 27, 1922.

Bitemporal Contraction of Visual Fields in Pregnancy.

PROF. C. E. FINLAY, Havana, Cuba. —On February 15, 1919, a case was sent to me in consultation, which gave rise to the investigations which form the subject of this paper.

Its Clinical History was as follows: Mrs. E., aet. 24, in the 8th month of pregnancy, had suffered a month previously a severe attack of influenza. After recovery she had developed a series of seizures of a cataleptic nature, during which she could not move, tho perfectly conscious of what was going on around her. Examination of her eyes showed slight contraction of retinal arteries and dilatation of retinal veins. Visual acuity 20/20. Visual fields: temporal contraction (more pronounced on right side) for white, with marked concentric contraction for colors, the red field being larger than that for blue.

I concluded that there existed a hypophyseal compression of the chiasm, but was at a loss as to whether this was due to a hypophyseal tumor, or to an enlargement of this organ in connection with pregnancy, and as to whether the cataleptic seizures were due to the enlargement of the hypophysis or were of a hysteric nature. The seizures continued after confinement, and some of the experts who later saw the patient thought there was some endocrin disturbance with hysteric manifestations.

But the study of the case made me seek to determine whether the normal hypertrophy of the pituitary body which takes place in connection with pregnancy was of such a degree as to determine changes in the visual fields. I examined the visual fields of 31 women awaiting confinement, selecting only cases that presented no general complications, with normal eyegrounds and perfect visual acuity.

From an examination of these visual fields, we find that only 9 could be considered approximately normal, the remainder showing changes in the nature of a temporal contraction: of these 8 were slight, 9 moderate and 5 pronounced.

These surprising results lead me to a thoro study of the literature at hand, in connection with the anatomic and other data requisite for a complete explanation. For a time I was under the impression that my observations were the only ones made in this connection, but I discovered that changes in the visual fields of a similar nature to those which I have recorded have been published first by Bellinzona and Tridondani, and later confirmed by Forti, which they all attributed to dynamic or vasomotor disturbances similar to those occurring in hysteria.

This more or less forced explanation seems to me unnecessary, as the changes described can be perfectly explained by the mechanical pressure brought to bear on the chiasm by the enlarged pituitary gland, resulting from the normal hypertrophy of this organ which occurs in pregnancy. The gland increases 2 to 3 times its weight and volume during this state, this being due to an increase in number of oxyphil cells in the "pars anterior," a good many of the disturbances occurring in connection with pregnancy being probably due to the corresponding hyperfunction. The differences in the degree of the changes in the visual fields depend on the degree of hypertrophy and on anatomic peculiarities,

which may favor or hinder the above mentioned compression.

In conclusion I consider I can establish: That during pregnancy there often occurs, as a result of the normal hypertrophy of the pituitary gland in connection with this state, a compression of the chiasm which manifests itself by changes in the visual fields in the nature of a bitemporal contraction, which varies in degree according to the amount of compression suffered, this depending on the corresponding amount of hypertrophy and on the anatomic peculiarities of the case, which may favor or hinder this compression.

Psychopathology in Ophthalmic Practice.

CHARLES F. HARFORD, M.D., Cambridge.—There is a new field of medical research, rightly claiming close attention at the present time, which is destined to influence every branch of medical study; and that is the rapidly developing science of psychopathology. No department is more likely to be affected by this than that of ophthalmology. Ophthalmic conditions often form an exciting factor in the onset of the psychoneuroses, and there are physical elements complicating most ophthalmic diseases. During the war, when acting as an ophthalmologist in connection with a British Division composed very largely of miners, I was for the first time brought in contact with the ailment most unfortunately named miners' nystagmus. I prepared a paper on this subject, with the title: Visual Neuroses of Miners in Their Relation to Military Service. I pointed out that nystagmus was only one of a series of symptoms in the disease, and drew attention to the great importance of the mental factor, and the possibility that these cases might be treated by suggestion.

At the Ophthalmological Congress in London in May, 1921, I expressed my conviction as to the importance of knowledge of modern psychologic teaching in ophthalmic work.

The application of the new psychology to ophthalmic practice will only gradually be realized; but it is hoped that the suggestions which have been made as the methods of mind wording may help many to interpret some of the difficulties occurring in their practice.

In certain cases psychopathology and ophthalmology meet. Most of these include some measure of dissociation in which repression with amnesia will have a part, and in which, often in proportion to the amnesia, there will be some emotional distress. In all of these it is probable that an unconscious motive can be detected, and the demonstration of this may lead to the resolving of the conflict, the restoration of harmony, and relief from the distress.

We shall consider these cases in three main classes.

1. The psychopathology of every day life.

This admirable phrase, used by Freud as the title of a volume, will form a good introduction to our subject. It is a mistake to regard all psychic disturbances as conditions which can only be dealt with by specialists in psychotherapy. The truth is that there is a psychic element in every malady, and that whether we know it or not we must deal with it if we are to help our patients. Every practical physician or surgeon recognises this, tho perhaps unconsciously; and an older generation with its stress on temperament anticipated much that is being taught in a new way to-day. The manner of the older practitioner was studied more closely perhaps than manner is studied at the present time, and the confident assurance of success in treatment can only be regarded as a method of suggestion. To-day we approach these problems with new light. In our ophthalmic clinics, public or private, patients come to us, not so much because they know of any distinct disability, as because they are anxious about themselves.

Mysterious pains in the eyes or head, floating bodies or clouds before the eyes, unusual appearances about the eyes or lids are often regarded as threatening disaster, perhaps blindness. In many cases the anticipation of evil is more serious than any actual dis-

ease, and may even produce illness; and in some this foreboding is the only trouble with which we may have to deal.

Obviously our duty is to eliminate any organic disease or cause for trouble, including particularly the correction of refractive errors. We must further seek to convince our patient, by our methods and manner, that we are genuinely concerned in delivering him from his fears, whether real or, as we may style them, imaginary. Only thus can we obtain that true "rapport" which must exist between doctor and patient if success is to be ensured. This gained, we may by simple persuasion be able to clear away the fear and suffering which may still exist, not because the patient is intentionally exaggerating his symptoms, but because of some unconscious prejudice or habit, which is responsible for the trouble. It is useless to treat these cases by stern rebukes or ridicule, however veiled. Action of this kind will only develop resistances which may result in troublesome repression, with an intensification of the malady.

Let us take an example from the common experience of a refractionist. The prejudice against glasses is often very great. In the poorer districts of London, and no doubt elsewhere, those who wear glasses are called goggle-eyed, or some similar nickname is given to them. During the war, soldiers were greatly prejudiced against glasses because the Army glasses were round instead of oval, as they are most commonly supplied in England. Many girls prefer to endure any amount of suffering rather than wear any form of glasses which may not be regarded as becoming.

The result of this is the development of an unconscious motive which shows itself in an unwillingness to give a correct history, in mistakes in reading test types, and later on in difficulty with glasses. These patients have come to us for some real complaint and a desire for relief from their troubles, but when they are brought face to face with the remedy they shirk the issue. They may be said to regress, to prefer phantasy to reality, in a word they act like children.

2. Psychic disorders of pronounced form associated with visual disturbances.

There is a second class of cases of a definite psychopathic character, which may vary from the persistent headache to the more pronounced forms of psychic troubles. The nomenclature of these conditions, which includes such terms as hysteria and neurasthenia, is likely to be misleading, so we will not here attempt any definite classification.

It will be sufficient to mention some of the symptoms common to many of these conditions. Headache, minor obsessions or delusions, often visual, tremors of various kinds, disorders of the circulatory, respiratory or glandular systems of the body may be met with. Fatigue, inability to concentrate on mental work, varieties of amnesia, insomnia and phobias of a distressing type may all occur.

Ophthalmologists have long been aware of the importance of correcting errors of refraction in cases of this kind, but with new knowledge much better results may be anticipated. There are undoubtedly cases which call for comprehensive treatment, and should be dealt with by a psychotherapist; but many of them will first consult an ophthalmologist, owing to the prominence of symptoms referable to the eye, and the importance of being able to diagnose the condition is evident.

To take an instance from my own practice. A patient consulted me on account of symptoms which had shown themselves a few weeks previously, on the occasion of the last eclipse of the sun. He had looked at the sun without proper safeguards and he believed that his eyes had been injured thereby.

He had some conjunctivitis and some slight astigmatism, and both of these conditions were dealt with. There was no sign of any retinal lesions and no scotoma or interference with his color perception. It seemed clear that his main trouble was psychic, and this was confirmed later

when, as the result of some slight exposure to glare, he was affected in the same way in spite of wearing Crookes' glasses, and was obliged to give up his work. His own medical attendant who was a writer on psychologic subjects, formed the same view of his case, and a course of psychotherapy was advised.

This is a common incident in ophthalmic practice, and it is important that it should be recognized, so that it may be appropriately treated. Any attempt to deal with such cases by simply assuring them that there is nothing the matter with them, without recognizing the psychologic aspect, may even intensify the mischief. Here again we see that ophthalmology occupies a central position, with the added responsibility which arises in consequence.

3. Pronounced cases of mental disease.

In the class of cases which would be certifiable by British law, the ophthalmologist is not likely to be concerned, except to deal with incidental defects which call for attention. Seeing, however, that the major psychic diseases are usually a development from the minor, it may be possible to prevent the graver forms of disorder by a careful recognition of the premonitory symptoms.

Since visual obsessions are a common element in these cases, it may be of value to inquire into their possible origin. I was recently asked to see a patient who was in a state of marked dissociation, with visual delusions. She stated she could see moving objects in the dark corners of the room, taking certain definite shapes. The purpose for which I was consulted was on account of defective vision, and the possibility of prescribing more suitable glasses. I found that she was developing opacities in the lens, which were mainly in the form of minute dots scattered thruout the lens. I am of the opinion that these early disturbances of vision due to incipient cataract are quite sufficient to form imperfect images, which may gradually materialize into a concept of defined objects, human or otherwise.

Possibilities of the development of serious psychic conditions in connection with cataract and in other cases of opacities in the media, should be carefully considered. The experience of ophthalmologists as to the relation between the cataract and psychic disorders might be a valuable contribution to psychologic medicine. In a case of cataract which was under my care and operated upon by a colleague of mine, the following points may be noted.

Previous to the onset of cataract, there were some psychic difficulties with prejudices and suspicions, which were evidently morbid. These were accentuated by other physical infirmities including deafness, and with the onset of cataract these were much increased. In spite of this mental condition, and indeed with the hope of relieving in some measure these symptoms, and in any case bringing some relief to a condition of pitiable discomfort, it was decided to operate. The change in a monotonous life, of removal to a nursing home with devoted nursing, had a great effect upon the patient. The operation was most successful; and tho, as the result of starting up in the night two days after the operation, a prolapse of the iris occured, recovery was satisfactory. During the after treatment her whole outlook on life seemed to change, and the improvement was most gratifying.

Glaucoma again is a disease in which the severity of the pain and the rapid interference with sight is likely to lead to serious forms of phobia. It is worthy of inquiry in these cases as to the possibility of the psychic attitude complicating the physical malady.

Operation for Strabismus.

DR. CASTRESANA, Madrid, Spain. Tenotomy alone is not to be recommended. For convergent strabismus it is uncertain and variable in its results, and should be abandoned except for rare cases. It is likely to produce retraction of the plica semilunaris and caruncle, secondary deviations, muscular paresis and difficulties of binocular vision. Muscular advancement with stripping of the muscle, as practiced unilaterally by some authors, is insufficient for the majority of squints if not combined

with tenotomy, and suffers from the defects of the latter when so combined.

Double muscular advancement alone, with the resection of the central fibers of the tendon, associated with a "rhomboidal suture," and combined with a weakening of the antagonist muscle when the deviation is marked, seems to be the ideal treatment for strabismus.

The "rhomboidal suture" is placed thus: It is passed from without inward thru the conjunctiva and tendon, near the upper edge of the latter. Near the line where the cut ends of the tendon are to be brought together, the suture is dipped into the sclera, passing forward and upward; and brought out higher than the edge of the tendon. It is then dipped into the sclera forward and downward, again brought to the surface, level with its original point of entering the sclera, and is carried thru the insertion of the tendon and overlying conjunctiva. A similar suture is placed at the lower margin of the tendon, the oblique parts of the two forming sides of a rhomboidal figure. Such sutures prevent the narrowing of the tendon.

Low degrees of strabismus are corrected by the double indirect advancement, with very little resection and the "rhomboidal suture." The higher degrees are met by a proportionate resection of greater extent and a weakening of the antagonist. By this treatment the esthetic result at first obtained persists and improves with time. The muscular equilibrium is reestablished, which does not usually occur with other procedures. The excursions of the eyeball gradually become normal, binocular vision is reestablished where possible, and improvement of visual acuity may occur. Patients must wear their correcting lenses, and may require orthoptic treatments as supplementary to the operative procedure.

A New Excision Method of Pterygium Operation.

Dr. E. Campodonico Lima, Peru.

Pterygium is of frequent occurrence in the tropics as compared with its relative rarity in the temperate regions. In the coastal zone of Peru, it is especially prevalent, owing to the dusty condition of the air, consequent on the dryness of the soil and the lack of rainfall.

In the United States I have seen few operations for pterygium; whereas, in Peru it is an operation of almost daily occurrence. In the following exposition I beg to outline a procedure which has given me the best results for a period already over twenty years.

The instruments needed are: lid speculum, small fixation forceps preferably one toothed, angular keratome, straight or curved fine scissors, fine silk suture, and occasionally a needle-holder. The operation is performed in three steps: (a) dissection of the pterygium's head out of the cornea and adjacent sclera by means of the angular keratome; (b) excision of the pterygium's head and body by means of small scissors, (c) suturing of the flaps.

I have nothing to say about the first and second steps, as the performance thereof is a matter of routine practice. I should insist upon the use of the anesthetic by instillation, not by subconjunctival injection, as the areolar infiltration resulting from the injection is detrimental to the accurate subsequent coaptation of the flaps.

The third step i. e. suturing, is the one wherewith I shall deal with some detail, on account of the decisive influence on the outcome and ultimate issue of the whole operation. The placing of the conjunctival suture and cicatrix in a position favorable for recurrence is the paramount disadvantage of most of the methods in vogue for the extirpation of pterygium. The safest plan is to remove such conjunctival union from exposure in the palpebral fissure, as by so doing, in the excision operation, we actually lessen the proclivity to recurrence. Our method consists in suturing the middle of the conjunctiva below the point excised to the episcleral tissue and conjunctiva of the limbus above the point excised. If there is gaping of the two edges of the incision these are drawn together with a second suture.

Occasionally and especially in cases when the pterygium's head is large,

it is advisable to undermine a little of the lower flap to avoid the stretching on this flap when anchored to the upper.

On drawing the flaps together, overlapping of a portion of the cornea may result; this, however, is quite uneventful, and on taking off the bandage in a couple of days time, everything will be found in a perfect coaptation.

Instead of making the lower flap movable and the upper one fixed, we may just as well do the reverse and anchor a loose point of the upper flap to the episcleral tissue and limbus conjunctiva of the lower. This we have done several times, namely in cases in which it is easier to loose and slide the upper flap than the lower. We prefer, however, the first way because the conjunctival seam is thus more efficiently protected by the agency of the upper lid from exposure. At the end of the operation, it will be found also that fibers which had before a horizontal direction now have a vertical one; their natural trend of growing is consequently thwarted.

A still further advantage in removing the conjunctival apposition line from the horizontal meridian is the fact that by so doing we eliminate in the horizontal line the presence of sutures, which undoubtedly act as a stimulus for reproduction of connective and fibrous cicatricial tissue just exactly in a place where it is least desirable.

The eye is bandaged for seven or eight days, after which the sutures are removed. The bandage is changed every other day. Whenever possible, it is a good plan to keep both eyes bandaged at least for a couple of days.

I have operated on hundreds of cases by the procedure just described, and have eagerly and abundantly tried every new method that reached my acquaintance, with the result that I always gave it up to return to the simple course I have outlined above.

The Subconjunctival Excision of Pterygium.

Dr. S. Lewis Ziegler, Philadelphia. That pterygium is a vascularized, fleshy growth of conjunctiva invading the cornea and composed chiefly of *hypertrophied subconjunctival tissue,* is a pathologic fact which is highly significant in its relation to both treatment and prognosis.

It should always be removed when it is progressive, when it interferes with vision, when it limits ocular motility, when a capital operation on the globe is planned, or when it is disfiguring.

The requisites to success are (1) thoro removal of the head, leaving clear corneal tissue, (2) careful excision of the subconjunctival tissue, especially about the limbus, (3) complete closure of the conjunctival wound, with close approximation to the limbus (4) the avoidance of conjunctival tearing and tension, (5) rapid primary union, with as thin a conjunctival flap as it is possible to secure.

Accepting the theory that subconjunctival hypertrophy is more or less cicatricial in character and possesses, therefore, a persistent tendency to undergo contraction, and that it is this tissue which invades the cornea and causes recurrence, I conceived the idea that the thoro removal of this subconjunctival tissue would not only encourage smooth healing, but would eliminate the danger of recurrence. Acting on this theory, I began in 1890 to practice the following simplified method of subconjunctival excision, which in my hands has proved to be not only a cosmetic success but has prevented recurrence.

Cocain is sufficient as an anesthetic, and adrenalin may be instilled as a hemostatic. If desired a stronger solution of cocain (20%) can be applied directly to the growth with an applicator, while the lids are held open to avoid contact with the cornea.

First stage:—The neck of the pterygium is grasped firmly with rat tooth fixation forceps, drawn tense, and the marginal fibers of the head freely divided with the back and point of a Beer's knife, used as a dull dissector. If the apex is unusually adherent, the knife may be passed beneath the neck and the head shaved off.

Second stage:—Still grasping the apex with forceps and holding it tense, both

sides of the pterygium are cut loose with the conjunctival scissors and the flap lifted up.

Third stage:—The forceps which grasp the apex are now handed to an assistant, who continues to hold the flap taut, while the *subconjunctival tissue beneath the flap* is grasped by a second pair of forceps and carefully dissected off from the conjunctiva by delicate snips of the sharp pointed conjunctival scissors. When the conjunctival flap is freed from the underlying tissue its apex is excised, and the remaining flap of pure conjunctiva dropped back toward the canthus.

Fourth stage:—According to the size of the scleral defect to be covered, I resort to one of three different procedures.

(a) *If the pterygium is small* the conjunctival wound is closed by two sutures, which may cause overlapping of the corneal margin. This overlapping is corrected by clipping the cuff like roll of conjunctiva in several places with scissors and pushing it back. As the conjunctiva again smooths out, these "pie-cuts" open into small diamond shaped perforations which relieve all tension and heal smoothly.

(b) *If the wound is larger and the conjunctival tension is great,* two short paracorneal incisions (5 mm.) are made, above and below, the conjunctival edges undermined and the wound united by two sutures, or

(c) *If the denuded area is extremely large,* two sets of liberating incisions are made, the paracorneal incisions above and below being supplemented by incisions made parallel to the first (5 to 10 mm.) and placed at the canthal extremity of the wound. The quadrilateral flaps thus formed are closed with two sutures and an anchor suture placed at the intersection as in Knapp's double transplantation.

As a rule, the simple technic of the first procedure (a) is wholly adequate to close the wound. Healing is smooth and prompt, owing to the avoidance of extensive dissection and the freedom from tension. A monocular dressing is applied for three or four days. The Liebreich patch may be worn a day or two longer. The stitches can be removed on the third or fourth day. Boric acid irrigation is used once daily until the pad is discarded, then three times a day. The eye usually remains red for one or two weeks. If there is lacrimal disturbance, the duct should be dilated at least ten days before the pterygium operation is attempted.

The principle of subconjunctival excision of the hypertrophied or adventitious tissue can be applied as well to any other of the well known pterygium procedures. I have tried it in McReynold's modification of the technic of Desmarres, Sr., and found it successful in producing a much thinner flap, which made the procedure a greater success.

Ocular Tuberculosis in Children.

DR. FRANCISCO POYALES, Madrid, Spain. In the ocular pathology of the child, the chapter on tuberculosis seems to have been neglected, especially as to the anatomic-pathologic verification of lesions. In three cases in which it was necessary to practice enucleation on account of serious lesions and as a prophylactic of therapeutic measures, the histologic study of the eyeball gave material utilized to determine the tuberculous processes causing the grave conditions presented to clinical observation.

Primary tuberculosis of the ocular globe presents great difficulty in its clinical diagnosis; and may be confused with other inflammatory lesions of a chronic type not presenting definite symptoms for differential diagnosis. There may exist no manifestation of tuberculosis in other parts of the organism. There is also absence of family history, negative v. Pirquet reaction and no previous ocular disturbances.

The secondary manifestations frequently are presented by patients with intestinal or pulmonary tuberculosis. A family history exists, the positive v. Pirquet reaction shows a soil fertile for infection, and there may have been repeated attacks of pustular conjunctivitis. In this form the clinical diagnosis is more simple. In the human eye including different layers, it is possible to observe either simple forms of infection of these membranes or combinations. Whenever in a chronic

or acute process we obtain no improvement by common therapeutic means, and the investigation as to other types of infection is negative, we ought to think of a tuberculous lesion.

The eyeball attacked by tuberculosis is sometimes destroyed before infection from it becomes generalized; and it is possible to find progressive zones from the cheesy, more advanced lesions to those invading more resisting membranes. We cannot exclude the possibility of general infection if we bear in mind the bacillary migration thru the blood. But ocular localization is favored by the capillarity of the arterial and venous plexes. The bacilli which resist the attack of the polynuclear leucocytes are detained in the vessels by a fibrinous thrombus.

1. A boy nine years old. Diagnosis, sclerokeratitis with chronic iridocyclitis. No family history, Wassermann negative. v. Pirquet negative. Pain in the eye, ocular hypotension, vision zero. Presented no symptoms of tuberculosis in any part of the body, but evidence of malnutrition. There was no improvement under appropriate treatment. Tuberculosis was regarded as the probable cause, and the eye was enucleated.

2. A girl, aged 13, had suffered a blow on the right eye three years before. Diagnosis; secondary glaucoma, and hemorrhage into vitreous and anterior chamber. R. gradually lost vision without pain, and the eye became smaller; and had been entirely blind for one year. The father died of tuberculosis, there was negative Wassermann and positive v. Pirquet. No hemophilia, malnutrition. She suffered in childhood from white swelling of the knee. Now has intense pain. Acute glaucoma. With no light perception and possible presence of tumor, foreign body or chronic tuberculosis, the eye was removed as a prophylactic measure.

3. Tuberculous cyclitis with luxation of the crystalline lens into the anterior chamber in a girl 9 years old, with pulmonary lesions of tuberculosis. Great emaciation and negative Wassermann. She had suffered three years previously a blow on the left eye, and since then had gradually lost vision, until it was now completely useless. Severe pain in the eye for a week. Eye hard with severe glaucoma, no light perception, and lens in the anterior chamber. Enucleation was performed.

The diagnostic value of the v. Pirquet reaction varies with the type of infection. In the first case, primary tuberculous lesions without other manifestations in other parts of the organism, the result was negative.

In the other two cases, with tuberculous lesions in the eye and in other parts of the body, the result was positive. This seems to indicate that it has diagnostic value in cases of secondary ocular tuberculosis. But it ought to be used whenever one suspects a primary manifestation. A positive result may be of great value in determining the etiology.

We have proved that an isolated primary lesion may cause by propagation the extension of the tuberculous process to the whole eye, without having it invade the rest of the organism up to the time of the enucleation, as in the first case.

The second case is one of advanced tuberculosis localized in another part of the body. This case makes us think that ocular tuberculosis may present stages similar to those of pulmonary tuberculosis, the comparison made between hemoptysis and hemorrhage in the vitreous is perfectly reasonable.

Our preparations make us believe that the destructive process in the iris, ciliary body and choroid in its advanced development empty the contents of cavities into the vitreous or anterior chamber, clinically simulating hemorrhage. The third case has value in illustrating complications, the best known being detachment of the retina, when there exist tuberculous foci in the choroid.

The therapeutic problem includes, first; conservation of the visual acuity of the eye. We should endeavor to effect this at any cost, whether the lesion is primary or secondary. The appropriate local treatment should be supported by general measures.

Second; when tuberculization of the eyeball is so intense that vision is completely abolished by irreparable damage, the eye should be enucleated as a prophylactic and therapeutic measure.

SPECIAL REPORT

INDUSTRIAL DISEASES OF THE EYE.

At the recent Congress held by the Ophthalmological Society of the United Kingdom, an afternoon was set apart for the discussion of industrial diseases of the eye (excluding accidents, miners' nystagmus, and glass blowers' cataract).

DR. T. M. LEGGE, (H. M. Inspector of Factories) opened the discussion from the administrative side. He spoke first of *conjunctivitis caused by hydrogen sulphid*. He saw, on one of his factory visits, a chemist with intractable conjunctivitis, specially marked in one eye. This man periodically applied the eye which was chiefly affected to a little peep hole where a process of manufacture was going on, and in doing so he lifted up a little piece of glass in order to see better into the chamber, and it was the resultant stream thru this aperature which kept up the inflammatory condition. He remembered, too, in the early days of the manufacture of sesquisulphid of phosphorus, that the life of a manager was made miserable by the small amount of hydrogen sulphid which was given off into the atmosphere when the sesquisulphid came into contact with moisture. This was not relieved until the whole process was carried on under a negative pressure.

He spoke chiefly on the *optic neuritis set up by lead poisoning*. He exhibited a carefully prepared chart showing the gradual decline of cases of this condition from the time when the instances numbered 1,200 in a year, to the present time, the fatal cases being shown in red. He separated the cases due to encephalopathy from those of optic neuritis uncomplicated by such manifestations as lead convulsions. He had also indicated those who were suffering from mania or mental hebitude. In the white lead industry, there had been a tremendous drop in the number of cases; there was also a large decrease in the paint and color industry. But there was no corresponding diminution to record in industries in which white lead was used, as in coach painting or ship building. Cases occurring in house painting were not compulsorily notifiable, and up to 1914—the industries were abnormal during the war—there was a steady increase in the number of cases occurring.

The diminution of the cases of optic neuritis due to lead in controlled industries was due to the fact, that in them an exhaustive system of ventilation by means of fans to take away the dust produced was in operation, whereas the dust caused by sandpapering the dry paint in coach painting could not be so carried away. The system of ventilation now in operation in the industries referred to did not depend on the workers' power of applying it or omitting to do so. Slides were shown illustrating the method in which this is carried out.

A factory which, just before the war was working for some country intensively on dinitro benzine, had 28 cases of poisoning by that substance, including 4 of amblyopia. During the Summer, owing to the volatility of the substance, a greater number of people were put on to work in night relays, and these cases occurred in a burst. When the shift was reduced to four hours, the conditions improved. Dr. Holmes, of Wigan, said he had never seen cases with such extreme contraction of the fields of vision.

During the war, T. N. T., which caused so much illness in the form of dermatitis and toxic jaundice, did not appear to have affected the optic nerve. Only two cases were brought to his notice, and in regard to these he had the reports of Dr. Patterson, of Edinburgh, who considered the weight of evidence favored their being due to tobacco, rather than to T. N. T. In reference to *tobacco amblyopia*, his colleague, Dr. Middleton, followed up the case of a woman, a nonsmoker, who for 25 years had been employed in the leaf room of a tobacco factory. About nine months before being seen, her vision commenced to be defective. Dr. Sym, of the Edinburgh Royal Infirmary, investigated the case, and he reported that it was a case of tobacco amblyopia. The woman had been exposed to finely divided tobacco dust

which was produced thru a fine meshed hand sieve.

Dr. Legge exhibited slides showing how, towards the end of the war, 12-inch shells were filled by means of movable flexible pipes, and the means used to carry away the fumes. He also exhibited slides showing how *anthrax* affected the eyelids. Before the use of antianthrax serum, the fatality of external anthrax—which was now normally 15 to 25%—was much worse when affecting the eyelid, especially the upper lid. At that time he considered that 40% to 45% of cases, when the upper eyelid was affected, would be fatal. Now, however, since the giving of the serum, in 80 c. c. doses intravenously, followed by 60 c. c. on the following day, the mortality of eyelid cases had been definitely reduced, so that the mortality in these cases was now much the same as in those where other parts of the body were involved. External anthrax seemed to be fatal in proportion to the degree of looseness of the cellular tissue at the site of infection; the eyelid was, of course, rich in such tissue. The slides shown were of different stages in eyelid infections.

Dr. Legge asked whether the increase in the long axis of the eyeball, constituting *myopia* could be regarded as an occupational disease. He commented on the comparatively little work which had been done on the subject of visual fatigue. Did the work, such as that of the compositor, cause myopia, or did that work merely cause special attention to be directed to a defect already there?

Mr. Bernard Cridland related his experiences in a large iron workers' district, and exhibited a table of cases with particulars and histories.

Professor Collis discussed the relationship between *visual acuity and vocational selection*. Employers were rapidly coming to see the disadvantages resulting from a worker and his work being ill mated; output was smaller when that was the case, and discontent was generated by seeing his fellow man earn more than he could earn himself; it accounted for men drifting from place to place in search for a congenial employment.

Behind the science of vocational selection lay the earlier science of vocational guidance, which should be in the hands of teachers and juvenile advisory committees, who, after ascertaining the capacity of each adolescent, should guide him in that walk of life wherein such capacity was needed and had scope. And no faculty had greater influence on capacity than that of vision, for as we saw, so did we react. Indeed, artistic appreciations must depend on visual acuity and the presence or absence of errors of refraction.

Visual acuity was definitely related to industrial efficiency; the need for good vision in the engine driver and the seaman had long been recognized, therefore there was surely need for the vision of all motor car drivers to be tested. Instances of the latter meeting with accidents were frequent, yet fining and endorsing the licenses seemed to sum up the resultant action, the men concerned being again let loose upon society. He knew of no case in which an offender had been referred to an ophthalmologist to have his sight tested. The Professor elaborated this theme by referring to personal experiences.

With regard to accidents, it had been concluded that 85% of all accidents were due not to absence of guards and safety appliances, but to such causes as negligence, carelessness, want of thought, and, most of all, to a lack of appreciation of danger. Greenwood had pointed out, as a result of statistical enquiry, that there was a varying individual susceptibility to accident; but no one had yet tried to connect such increased tendency with defective eyesight. Nevertheless, the relation between deficient illumination and accidents had been pointed out by Wilson and Patterson in this country, and by Simpson in the United States. The latter authority estimated that out of 91,000 accidents, 23.8% were due to imperfect illumination.

Innate imperfect visual acuity might be an important factor in determining individual susceptibility to accident; certainly muscular contraction was less accurate and more liable to error where vision was imperfect. Visual acuity must also affect industrial efficiency. He was not aware that anyone had ex-

amined the best and the worst workers in different processes to ascertain their respective visual acuity; yet not until this had been carried out could anything valuable be known of the visual needs for different occupations. There was a great tendency to look after the rare and unusual diseases, which, after all, were but as a drop in the ocean.

With regard to the effect of industries upon visual acuity, certain occupations did produce certain of the eye diseases. Miners' nystagmus (which had been ruled out of this discussion) was associated at one end with very low illumination, and at the other end were cases of cataract caused by excessive exposure of the eyes to heat rays from molten metal. But what was less clear was the effect produced by less pronounced exposure in the ordinary circumstances of work. A necessary preliminary was to know the visual acuity possessed by the general community of the same age as these workers; he knew of no such information, but it was much needed. The closest approximation was that of juveniles of school age, but this could not be applied to adults, especially those of middle age, the age when the effect of occupation was most pronounced.

It seemed clear that the human eye was never evolved for the purpose for which it was now so constantly used, and when so used it was found to be a more or less defective organ. How far this use acted injuriously required to be determined, so that acuity and occupation could be effectively mated. He pleaded for research upon the lines he had indicated, so that employers who needed people to work at various processes might know what standard of vision to look for in the people they might choose.

Mr. Healy referred particularly to *tin plate workers' cataract*. In this industry he had seen a type apart from the posterior polar variety, and one found the posterior polar variety associated with the cortical variety in the lower cortex. Whatever the cause of the posterior polar variety might be, it was probably also the cause of the broom like opacity in the lower and inner cortex. He did not think direct rays had much to do with it. He believed that heat rays were absorbed by the iris, and that owing to that continual absorption, an alteration occurred in the secreting endothelium, and in that way the aqueous was altered; it might lead to the increased formation of salts in the aqueous, and there might occur spreading along the ligament to the lens defects of epithelium, thereby admitting aqueous by osmosis into the lens substance, leading further to swelling of lens fibers, and in that way to the production of cataract. The cortical variety might possibly be produced by some alteration in the essential lymph channel which reached the posterior pole.

He agreed with those who said there should be further investigation as to the effect of manual labor upon the general bodily health. He had in mind the case of a man aged 41, a rollerman in a mill, who consulted him because of homonymous hemianopsia, which had come on suddenly. He retained central vision, but the condition never improved. No cause for that man's arteriosclerosis could be found; his blood pressure was 205 mm.; his Wassermann, done several times, was negative, and several good physicians failed to find any cause for his arteriosclerosis. Possibly men who were engaged in hot work such as this, and were constantly sweating and imbibing large quantities of fluid, might develop arteriosclerosis in consequence, and this might be an adjuvant factor in the production of cataract.

He had seen many cases of cataract among iron workers, and in them the results after operation were as good as in the general run of the population who had senile cataract.

Dr. Brinton (of Johannesburg) said that occasionally posterior polar cataract was encountered in gold smelters and assayers, who had to be constantly assaying small samples in crucibles. It was not included in the diseases for which compensation was recognised, but he had got the manager of a large mine to recognise it as a subject for payment. He had never yet encountered a case of cataract from heat in the native; possibly because the native had always been accustomed to considerable heat. H. Dickinson.

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RADIOGRAPHY OF FOREIGN BODIES IN THE EYE

The foreign bodies it is important to locate in the eyeball or orbit are generally small, and the majority of them are situated in the anterior part of the eye. They vary in the density of the shadow they throw on the X-ray plate, but all of them are more or less permeable to the rays, like the soft tissues in which they are imbedded. The great obstacles to getting good X-ray films or plates, of such bodies, have been the heavy shadows cast by the bony walls and margins of the orbit, and the mobility of the eyeball.

Many of the foreign bodies, to be searched for in this locality, cast shadows less dense than those of the orbital margin. Most of the work of discovering and locating these foreign bodies has been done on the supposition that the examination must be made with tubes and exposures that will cause the rays to penetrate even thick bony masses; and will leave no perceptible shadow from the soft tissues, in which the particles sought are situated, and their exact relation to which it is most important to find out.

Whenever it is possible to obtain a radiogram showing the soft parts, as the lids, lashes, profile of the cornea, etc., the foreign body will give a more distinct and noticeable shadow on it than on a plate obtained by an exposure that gives a lightening of the bony shadows and no visible shadow from the soft parts. Then, too, the picture which shows the soft parts is obtained by a shorter exposure; so that it is easier to avoid movements of the eyeball that might prevent a small foreign body from giving any distinct shadow

The difficulty in getting the more desirable short exposure picture is the difficulty of placing the plate or film, where it can receive the rays that have passed thru the eyeball without having to pass thru the bony walls of the skull. When the first cases of X-ray localization of foreign bodies in the living eyeball were reported to the American Ophthalmological Society, in 1896, Clark described a method of wrapping a piece of film in black paper and thrusting it up in the nose, on the side nearest the foreign body, where it would be reached by the rays thru the thin inner wall of the orbit; and he

presented negatives taken in this way from the cadaver, that showed very clearly thin metallic bodies in the orbit, well back of the eyeball.

Recently Vogt (see O. L. for March, v. 18, p. 9) has described a method of thrusting the sensitized film, properly wrapped, into the conjunctival sac adjoining the nose, or in the lower cul-desac; and placing the tube so that the rays will pass just anterior to the outer or upper margin of the orbit; thus getting negatives of great distinctness and delicacy, showing the anterior segment of the eyeball, and any foreign body it contains. Even foreign bodies that would cast no appreciable shadow, if the exposure had been sufficiently prolonged to lighten up the shadows cast by the thick bones of the skull, are shown clearly.

It has generally been thought important to get negatives that would show all the orbit and adjoining parts, so that, whether the foreign body had lodged in the eyeball or deeper parts of the orbit, its location would be revealed. But it is even more important to have a negative on which the foreign body has cast a perceptible shadow, no matter how small it is; and one on which its presence will not be concealed by the slightest movement of the eye.

It is not always understood how much of the eyeball is accessible for these more definite, delicate, and reliable X-ray pictures of the soft parts. Under local anesthesia a piece of film can be thrust into the nasal portion of the conjunctival sac, back to about the equator of the eyeball, in most eyes without serious discomfort; and in the average person more than half the eyeball is in front of the outer orbital margin. Among 4,500 patients, measured by the writer, the average protrusion of the apex of the cornea in front of the outer margin of the orbit was over 17 mm. It was over 16 mm. in front of the bone plus the soft parts. In many persons the protrusion is over 20 mm., and in some the whole eyeball is in advance of the temporal orbital margin.

Most X-ray specialists are accustomed to get X-ray plates of the orbit by exposures that penetrate the bony parts, so as to lighten their shadows. Such plates are necessary for many purposes. But to reveal small foreign bodies in the anterior portion of the eye, they are inferior to exposures that will leave the outlines of the soft parts visible and the bony shadows black and obscure. It may be necessary for the ophthalmologist to call the attention of his X-ray specialist to these facts, to get his best assistance in the detection of minute foreign bodies, which are usually found in the anterior parts of the eyeball. The insertion of a film into the nose, where the rays will have to penetrate only a thin lamina of bone, may demand the technical skill of the rhinologist. But it is certain that films obtained by these methods can be made to give most important evidence as to the presence and location of small foreign bodies. They should be included in any complete radiographic examination.

E. J.

THEORIES OF COLOR VISION

It is often noted that a long list of remedies for a certain condition, for instance trachoma, is good evidence that no thoroly effective remedy has been found. In the same way, the existence of a number of competing theories to account for a particular group of phenomena, may be taken as proof that no satisfactory theory has yet been promulgated. This is particularly true of theories of color vision. The theory of Young, patched up by Helmholtz, finds a rival but not a successor in the theory of Hering; and those of Ladd-Franklin and Edridge-Green struggle vainly to replace the older conceptions, and in competition with each other. Also, hypotheses like that of von Kries of a double function, one of light the other of color vision, still further complicate the situation and burden the memory.

A theory to account for physical phenomena, and still more, one to account for vital phenomena, serves somewhat the same purpose as a diagram used for illustration. It does not

present or take cognizance of all the details, like a photographic reproduction. It picks out certain facts that are deemed most important, and attempts to show their relations, or possible relations, in a way that will help in understanding and remembering them. A diagram may be of very temporary usefulness, drawn to illustrate a certain point and rubbed out a few minutes later; or it may be worthy of a permanent place in a book or in memory, as affording a good scheme on which to arrange important facts.

The same is true of a theory. Even "established theories" only explain and unite the known facts. How completely they may be rendered obsolete has been illustrated by the theory of fixed chemical elements, and the discovery of radium and the progressive alteration of this and allied "elements." The difficulty about color vision has been that some useful hypothetic suggestions have too often been repeated and discussed as "established theories;" so that they become obstacles and not helps to the understanding and remembering of facts. When theorizing gets beyond the known facts, it becomes idle speculation; and, however interesting it may be, it should have little place in scientific treatises or discussions.

The known facts are, that certain sensations spoken of as colors are associated with certain wave lengths, or vibration frequencies of light. But between the vibrations that reach the retina, and the sensations we perceive, and talk about, there is a gap, which it has been attempted to bridge with speculations and hypotheses. About the transformation of light into sensation or memory, or the nature of the process by which the retina influences the brain, or how much of this transformation is done in the retina and how much in the brain, we know very little.

The assumption of three or four kinds of substance in the retina to respond to particular wave lengths of light, or separate receiving segments of the rods or cones, each responding to a particular wave length, or different sets of nerve fibers to carry different impulses from the retina to the brain, cannot do away with the necessity for brain centers capable of differentiating between the various impulses sent in. The power of one segment to receive and one fiber to transmit different impulses, is just as easy to assume, is far simpler and is quite as much in harmony with what we know of the transmission of light, heat and electricity outside the body.

We know that the same wire transmits all sorts of electricity with equal readiness and certainty. The multiplex telegraph sends a dozen messages, both ways at once, over a single wire; the identity of the messages sent and received being secured by the sending and receiving apparatus independent of the wire. We know that vibrations come to us across space, measured only by light years, every vibration preserving its identity and reaching its destination prepared to make its perfectly characteristic impression. Why should we assume that this ability to transmit different impressions is not possessed by each nerve fiber that connects the retina with the visual cortex; or that the ability to discriminate between different impulses reaching it is not possessed by the brain cell thru which we become conscious of those impulses?

Young and Helmholtz lived before wireless telegraphy was worked out. Hering propounded his theory before the tuning of an instrument to receive any one of a great series of electromagnetic vibrations was understood; or the enormous multiplicity of vibrations, with which we are now familiar, was discovered. It is likely that speculations and hypotheses put out along other lines would be more helpful today, than are those still preserved for us in the text-books, like mummies in the tombs of Egypt. If we admit that nerve fibers and nerve cells have as varied powers of transmission and appropriate reaction as copper wire or glass, we can project our speculations and hypotheses along new lines.

E. J.

BOOK NOTICES

Methods of Studying the Functions of the Different Organs of the Body. Organs of Sense: Light Sense and the Eye. I. **Examination of the Eye in Red Free Light,** by **A. Vogt** of Basel. II. **Retinal Functions,** by **Adolf Basler** of Tübingen. III. **Methods of Representing Nystagmus,** by **H. J. L. Struycken,** of Breda. In the "Handbuch der biologischen Arbeitsmethoden," edited by Geh. Med.-Rat. Prof. Dr. Emil Abderhalden, Director of the Physiologic Institute of the University of Halle. a. d. Saale. Abt. V, Teil 6, Ht. 3, p. 365-462. Published by Urban and Schwarzenberg, Berlin and Vienna.

This book consists of 98 pages, with 70 illustrations, one of which is a colored drawing of retinal atrophy as seen with the red free light. The paper is of good quality and the printing is good. References are found either in the text or as foot notes, either of which, and especially the combination, is inferior to having them at the end of the article.

I. This part covers 14 pages, and is subdivided into three parts: (1) description of the apparatus employed, (2) technic of its use, and (3) the appearance of the fundus in red free light. Under ordinary illumination, there are two components of the light reflected from the fundus: one, the "retinal light," which is only slightly altered, and the other, the "choroidal light," which is colored red by the blood thru which it passes, and usually overshadows the "retinal light." By use of the red free light, however, the conditions are reversed, as the retina is converted into a more or less opaque medium, giving more reflection and showing up the more anterior layers of the retina better than the posterior. The macula is shown in its true yellow color, and its changes are made more manifest. Finer and more numerous blood vessels, hemorrhages, etc. are shown in the rest of the fundus, as well as the normal state and the pathologic appearances of the nerve fibers.

II. This part covers 76 pages, and is treated under the following headings:

I. Methods of examining the relation between vision and the retina.

Monocular visual field. (a) Defects and the blind spot. (b) Limits (examination with the perimeter.) (c) The macula: (1) general; (2) the macroscope; (3) entopic observations of the yellow spot. (2) The light perceiving retinal layer. (3) Mechanical irritation of the retina.

II. Methods of examining visual sensations without reference to their relation to the retina.

(1) Threshold determination. (a) Brightness threshold; (1) differential threshold; (2) absolute threshold; (3) method of estimating the smallest amount of energy necessary to stimulate the retina. (b) Time threshold. (c) Quantitative threshold.

(2) Duration of the sensation.

(3) Spatial sense. (a) Visual acuity. (b) Delicacy of the optic localising power. (c) Irradiation.

(4) Perception of movements. (a) Velocity threshold: (1) lower threshold; (2) upper threshold. (b) Methods of examining other facts of the perception of movement. (c) Quantitative threshold of movements: (1) minimizing the movement thru great distance from the eye; (2) mechanical minimizing; (3) optical minimizing. (d) Quantitative threshold of movement at the periphery of the visual field. (e) Brightness threshold, for movements. (f) Pseudomovements: (1) movement after images; (2) simultaneous pseudomovements.

(5) Blending of brightnesses. (a) Methods of blending. (b) Method of demonstrating Talbot's law.

(6) Blending of forms.

(7) Cinematographic sensations.

(8) Intermittent illumination.

Many of the above are of academic importance only, but many are of great practical importance.

III. The third part occupies 8 pages, and consists chiefly of a description of the method of photographing nystagmic movements.

C. L.

Manual of Diseases of the Eye. Charles H. May. Tenth edition, 1922. 377 illustrations, 440 pages. Published by William Wood and Co., New York. Price $3.00.

This book, undoubtedly the most popular of the smaller text-books on ophthalmology now appears in its tenth edition in 22 years. Its value is attested by its numerous editions as well as by the fact that it has been translated into German, Italian, French, Dutch, Spanish and Japanese, and a Chinese edition is now in press. The present American edition contains 440 pages, with 377 illustrations; of which 22 are plates, with 71 colored figures.

In a book of this size, naturally much must be omitted which the larger text-books supply in more detail; but this is a decided advantage to the student and general practitioner for whom the book is intended, who is likely to become confused by a multiplicity of descriptions. The operations are those which in the experience of the author have produced the best result. It would be advisable in the next edition for the author to mention some form of lid retractor for use in cataract operation, in addition to the self retaining speculum illustrated. Also the new anesthetic, butyn, and parenteral injection of milk, which is enjoying such popularity, especially in Germany, should be mentioned. The book will undoubtedly be received with the same approval which has greeted its predecessors.

C. L.

CORRESPONDENCE

Ophthalmic Meteors.

To the Editor:—In the broad expanse of the heavens to which the term firmament is applied, there are countless celestial bodies. Some there are like the sun and the moon, that have definite functions in connection with our own terrestrial sphere; others are there, whose uses are doubtless important but unknown to us, but seemingly their decorative value is the greatest. Still others loom up in our visual field from time to time, dash across the sky with reckless speed attracting the attention of everyone, lay and professional alike, and pass out of sight into the yawning chasm of oblivion to be heard of no more.

Our ophthalmic firmament also has definite substantial bodies with uses so valuable and well known as to suffer depreciation by becoming commonplace, while the spectacular features of the meteoric bodies that come to view from time to time, detract attention from the old reliable and steadfast.

The comparison is not so inapt when we recall the visits of the missionaries of ophthalmic progress that have come to our shores in the past year or two. Out of the Far East—out of India—from towns with names, the very sound of which brings to our minds the luxurious era of the Grand Moguls, and the gorgeous trappings of the Maharajahs, have come two exponents of new kinds of ophthalmic operations—Elliot and Smith. From all over the world have come searchers after ophthalmic truth to the clinics of these master surgeons, and carried back to the remote villages from whence they came, tales of the prowess of these worthy men.

Heralded by his wonderful success and welcomed by his countless friends, Elliot, personally, proceeded to carry the mission into the very heart of the wilderness country, from the fishing hamlets on the Atlantic Coast to the trading posts on the western slope of the Rocky mountains, until scleral trephining became an ordinary procedure that no one hesitated to do. The mission was a success. The converts were many.

But as the luminosity of this star begins to wane, another is sighted. This time the mighty Smith—Smith of India—genial, lovable, generous and considerate, as all his pupils testify, engages our attention. The Indian method of extraction of cataract in the capsule, long since familiar to us thru the efforts of the advance guard of the real prophet, now comes to us for demonstration of the way the master does it, and strange to say, not at all the way his precursors have demonstrated

it. We hold our breath at the very audacity of the operation, but our attention is divided among the several features of the technic, and the personality of the operator, of which we were previously in complete ignorance. From the domain of the sacred codfish to the humble huts of Hollywood, the intracapsular way is shown to the multitude. The dissenters are completely overcome and thrust aside. The new era is complete.

But as the sun sinks in the west at close of day, and the moon rises to rule the night, so with the passing of one comes the appearance of a still newer one. The Peacock throne, the Durbar, the Holy City of Benares, the Black Hole of Calcutta, and the other countless thoughts of India that have surged thru our brains as we met and talked with these men, are to be replaced with visions of bull fight, matadores, toreadors, Spanish opera, Alhambra and others, as the good ship bearing Barraquer of Barcelona, Spain nears our shores.

Pleasing in personality, modest, graceful in the guidance of a delicate but powerful force in the suction operation for cataract, Barraquer rises to the same eminence in our community as his Anglo-Indian colleagues. With open mouth we gape in amazement at the possibilities this method suggests, but confine our thoughts only to its possibilities in skillful hands. Our profession in this country is enriched by this contact with the work of this land of romance and passion. Wonderful as this method might be, the shyness of its exponent is responsible for its lack of notoriety. But the man and his method attained the same heights as his predecessors.

But here again the glories of one star are but of passing moment, and the already new must give way to another. Our learned and esteemed teacher Ernst Fuchs follows in due season, but here our analogy must admit of considerable cutting and fitting. While bringing to our mind such new and valuable points that have survived the recent parlous times in his home country, like the older and more familiar sun and moon, he brings to us a note of conservatism, to which we most heartily subscribe.

We can, and do, get a measure of success from scleral trephining in glaucoma, but we do not get the same high percentage of dependable results as we do from broad iridectomy, Fuchs says the trephine openings heal up, something certainly happens to them, if the patient has a true glaucoma. A healthy eye without glaucoma would give an ideal result—if that is the kind of ophthalmology you desire to practice.

The Smith operation is certainly desirable under the undesirable conditions prevalent in India. Here we must obtain good vision in order to consider any operation successful, and with Fuchs we heartily agree that there is as yet no valid objection to the perfected operation with iridectomy, cystotomy, and if need be, secondary needling in the hands of a skilled surgeon. The bungler will have trouble with any operation, but if a man equally skilled in both operations leans with preference towards one, then that operation on its own merits alone, may be considered to be the better of the two.

The Barraquer suction method in Barraquer's hands is doubtless a very good one, but its possibilities in other hands, positively bring cold shivers down the backs of the onlookers. Barraquer has said that had he need of an operation for cataract, being unable to have himself perform the suction operation, he would prefer the older method of extraction.

But progress is made if only the undesirability of certain methods is made certain, and while attracted by the skill and the ingenuity of this Spanish surgeon, we cannot feel that his is adapted to our needs.

And so it is the comets and meteors shoot across our skies, but for our daily tasks our commonplace sun and moon are our steadfast and reliable helpers. Our mental excursion into the atmosphere of the Orient recalls a quotation from Omar Khayam:

"Myself when young did eagerly frequent
Doctor and Saint and heard great Argument.
About it and about; but evermore
Came out by the same Door as in I went."

L. Webster Fox.

Philadelphia, Pa.

"Spectacles versus Eyeglasses."

To the Editor:—The small controversy on this issue, to which two old-time friends (Gould and Murphy) have committed themselves, seems to "point a moral" even if it does not "adorn a tale."

There is no gainsaying the rule that, until the eyes have been educated by spectacles, eyeglasses should not be ordered for continuous wear. They are ponderable, and their position, no matter how firmly attached to the skin, is inconstant because the skin will slip on the bone as the body moves; so that one, even without astigmatism, must make constant adjustments as for moving objects, more difficult if there is astigmatism. On the other hand, where glasses are worn only for close work, and the occupation generally sedentary, the convenience of eyeglasses (on an average nose) is a factor that may outweigh the more cumbersome spectacles' steadier images.

Cold science in excess, and "waiving a point" to please a patient are not to be commended as routine procedures.

Truly yours,
H. B. YOUNG.

Burlington, Iowa.

Lens Extraction by Negative Pressure.

To the Editor:—In re an article in the May, 1922 issue of the Journal by James M. Ball, of St. Louis; on page 359, credit is given for extraction of the lens by negative pressure to an American ophthalmologist, Dr. Vard H. Hulen. Would that this were the case, but unfortunately in 1884, Burchardt advocated the idea of extraction of the lens within the capsule by suction. Later, Stoewer, of Witten, at the Heidelberg Congress in 1902, presented his instrument and the description of cases operated upon by this method. The spoon was identical with the one used by Barraquer, and the negative pressure was obtained with a rubber ball.

To call a method of extraction of the lens by negative pressure by the name of Barraquer, is no more justified than to call a method of extraction of the lens within its capsule by external pressure by the name of Smith. Both of the operators in question merely applied in a wholesale manner methods but little known.

Very truly yours,
HARRY S. GRADLE.

BIOGRAPHIC SKETCHES.

T. H. SHASTID, M.D.
SUPERIOR, WISCONSIN.

ELLIS, HENRY BERT, (H. Bert Ellis), a well known ophthalmologist of Los Angeles, California, died at his home in that city on May 15, 1922. He was born at Lincoln Center, Me., May 17, 1863, being, on his mother's side, a descendant of Governor Bradford of Massachusetts, and, on the father's, of Thomas Davis, Lord Mayor of London in 1867. His father was James Henry and his mother Annie M. Bullard, Ellis. The subject of our sketch received the degree of Bachelor of Arts at Acadia College, Wolfeville, N. S., in 1884, and the Doctor in Medicine at Los Angeles Department College of Medicine of the University of California, in 1888. He studied the eye, ear, nose and throat at the universities of Göttingen and Vienna. From 1889-93 he was engaged in general practice in Los Angeles; since 1893, at the same place, in the practice of the eye, ear, nose and throat only. He was a Fellow of the American Academy of Medicine, the American Laryngological, Rhinological and Otological Society, and the American Academy of Ophthalmology and Oto-laryngology. He was attending ophthalmologist to the Children's Hospital and the Los Angeles County Hospital. He was formerly professor of physiology in the College of Medicine of the University of California, and held the chair of ophthalmology in the same institution from 1896 to 1915.

Dr. Ellis was a large, stout man, of a ruddy complexion and a deliberate manner. He married, first, Lulu Talbot, and May 27, 1907 he married Florence Chandler.

ABSTRACTS

Wernicke, Otto. Glaucoma as the Result of Intraocular Disseminated Sclerosis. Buenos Aires, 1921.

The author enlarges his theory about keratoconus, assuming that glaucoma simplex is the result of a plaque of multiple sclerosis localized in the papilla. While in keratoconus the apex of the cornea is the less resistant point which gives way to the intraocular pressure, in simple glaucoma the lamina cribrosa, weakened by the development of the cavernous degeneration described by Schnabel, gives way and produces the excavation. Congestive or acute glaucoma can be explained by the localization of the sclerotic process in the angle of the anterior chamber, hindering filtration and producing increase of pressure.

As proofs of his ideas, Wernicke asserts: First, that the intraocular pressure remains generally normal in simple glaucoma. Second, that Schnabel found a case of multiple sclerosis associated with cavernous glaucomatous degeneration of the optic nerve. Third, that Koeppe has recently found as a preglaucomatous symptom, changes in the iris with wandering of large amounts of pigment.

The author recognizes that sclerosis disseminata is a disease of young people, while glaucoma is mostly to be found in old age, but the former is a long protracted disease, the foci tending to regression and may be stopped or overlooked, appearing later in life.

URIBE TRONCOSCO.

Bárány, R. Optical Nystagmus and "Railroad" Nystagmus. Upsala Läkareförening Förhandlingar. Vol. 26, Parts 5 and 6, Art. III.

By railroad nystagmus is meant such a nystagmus as a normal person shows in viewing the landscape from a moving train; the nystagmus presents its quick component in a direction opposite to the apparent motion of the landscape. A moving belt marked with vertical black and white stripes is used in testing for this nystagmus. The author has observed in a number of instances that in using this test, with a patient who already has an optical nystagmus—the nystagmus often present in cases of reduced vision—he obtains a nystagmus opposite to the normal, i. e., a nystagmus in the same direction as that of the belt. No satisfactory explanation for this reversal has so far presented itself.

D. L. T.

Addario, La Ferla. Injections of Sterilized Milk in Ocular Therapy. Arch. di Ott., 1921, v. 28, p. 204-213.

In a brief report of literature, the author mentions the report of Jocqs, who treated 26 cases of severe serpent ulcer by milk injection, without any other treatment, in all of which the hypopyon cleared up very quickly and good results were usually obtained. In one case with serpent ulcer and a suppurating lacrimal sac, the suppuration of the sac stopped entirely after the first milk injection, without treatment to the sac itself. Jocqs believes if the first injection has no effect, further injections are mostly useless.

The author has used milk injections in about two hundred cases, of which six examples are reported in detail. One was a very severe iridocyclitis which had resisted all other treatment. Twenty-four hours after the first injection, the hypopyon cleared up and in five days the eye was quiet. In one case, the pain from the postoperative hemorrhage into the anterior chamber stopped two hours after the milk injection.

In one case, injections were used as a prophylactic measure, before removing the prolapse from a perforating ulcer in the presence of severe catarrhal secretion in the conjunctival sac. Recovery from the operation was uncomplicated. A case of gonococcic conjunctivitis in a baby with an ulcer showed marked improvement twenty-four hours after the injection, and progressed steadily to a cure with three more injections. In cases of trachoma and phlyctenular conjunctivitis with recurrent ulcers, favorable results were

obtained likewise. The author thinks milk injections are indicated in all cases where body reaction is sluggish. The effect is especially surprising on the symptom of pain, which disappears almost at once.

S. R. G.

Williamson, F. A. Thrombosis of the Retinal Vein, Showing a Hole and a Star in the Macula. British J. Ophth., v. 6, No. 2, 1922, p. 67.

The observer's discussion of the pathology of hole at the macula is accompanied with four photographs from the above cases. He refers to Ogilvie's theory, the thinness of the fovea and tear by "contrecoup", Fuchs' theory of a mild traumatic retinitis, with a mild toxic stimulus resulting in a slight serous exudate with rupture, and Coats' theory of edema.

The first patient had failing vision 14 years, with history of trauma 30 years previous. The eye was removed for absolute glaucoma. Sections showed no cupping of the disc, and a thrombosed vein near its margin. In the macular region the rods are fairly well preserved, but between them and the pigment layer is a thin layer of structureless material, presumably edematous fluid. A section near the fovea showed a cyst whose anterior wall was the membrana limitans externa of the retina, the layer of rods having disappeared. A section at the fovea showed absence of anterior cyst wall, thus presenting a hole.

The second case showed a thrombosed vessel on the side of the slightly cupped disc. Between the disc and macula there was a small collection of coagulated fluid between the choroid and rod and cone layer. At the macula a much larger collection of exudate, the retina showing advanced cystic degeneration. No macula hole, but if the condition had lasted longer a hole might have formed. After discussing three points in favor of the edema arising from the retinal vessels and five favoring a choroidal origin, the author suggests the following possible solution of the problem.

In these two cases we have a toxic influence—shown by the presence of the iridocyclitis—acting on the retinal veins, causing thrombosis, and acting on the delicate macular choroidal capillaries, causing degeneration of their walls, increased permeability to fluid, and consequent edema. This fluid then diffuses or osmoses thru into the potential space between the rods and cones and the pigment epithelium, preventing the access of nutrient materials from the choriocapillaris so that the superjacent retina degenerates and forms a hole.

D. F. H.

Herbert, Lieut.-Colonel H. After Treatment of Small Flap Sclerotomy. British J. Ophth., v. 6, No. 2, 1921, p. 65.

At the time of Cruise's observation regarding the application of finger pressure to the eye as an immediate after treatment, Herbert was not much impressed. He had used massage with very little effect. This he now believes was due to beginning too late. The application of gentle sustained finger pressure thru the lower lid may be begun on the afternoon or evening of the operation day, and repeated two or three times daily, partly emptying the anterior chamber. Excessive use of this pressure may be expected possibly to increase the number of partly fistulous cicatrices, but such scars from this operation do not seem to lead to late infection. After the first few hours the patient should be encouraged to keep his eyes open and to blink frequently.

D. F. H.

Wright, Robert E. Keratomalacia in Southern India. British J. Ophth., v. 6, 1922, p. 164.

The author discusses the relation deficiency diseases have to keratomalacia. Particular attention is given to the deficiency of the vitamin fat-soluble A. It is still questionable whether the clinical condition described as keratomalacia or xerophthalmia is similarly produced as the experimentally induced lesions in white rats by McCollum and his coworkers. The author quotes Col. Kirkpatrick of the Madras Government Ophthalmic Hospital:

"They are never without such cases, particularly during famine periods. It is more common with children, yet it is present in adults. There is lack of some essential substances in the dietary that experience has shown are present in cod liver oil. A premonitory sign of the disease is a condition which closely resembles, and is probably identical with ordinary night blindness. The triangular area of conjunctiva exposed by the palpebral fissure stiffens, showing later a soap lather formation. The cornea hazes, and later melts away exposing the iris, the bulb later becoming phthisic. Atropin is generally harmful. Castor oil, chlorides of calcium, sodium and ammonium are useful but the essential remedy is cod liver oil."

Wright comments that no doubt in certain cases epithelial xerosis and keratomalacia tend to overlap. There is not necessarily a triangular patch of xerosis nor yet white foam in keratomalacia, altho such may occur. On the other hand, the triangular or rounded islands of greasiness on either side of the cornea may occur in an apparently otherwise normal individual, without night blindness, and the term epithelial xerosis seems to fit such cases. Since bad and insufficient food is almost universal amongst the poorer classes, we have locally all the factors necessary for the production of a vicious circle, such as one is accustomed to associate with keratomalacia, in which alimentary tract and liver play their part.

There is in Southern India a clinical condition known by the name of keratomalacia, in which the symptoms of corneal degeneration form one of the leading features, inasmuch as it most frequently brings patients to seek relief; night blindness is frequent but not so important a symptom. The disease is not sharply marked off, but is a complex generalized disorder frequently associated with affections of the alimentary canal, grave constitutional disturbance and marasmus. In advanced cases it frequently ends fatally with terminal intestinal and lung affections. In less severe cases, blindness is a common result.

It is practically always associated with deficiencies in the dietary of a general type, but general deficiency is so common, that to account for the comparative rarity of the disease one must suppose that other etiologic factors or determinants are necessary. Clinical observations suggest the great importance of the liver, thyroid and intestine in these respects. The condition does not appear to correspond to experimental keratomalacia or xerophthalmia, due to the deprivation of fat-soluble A; nor does it respond in the same way to the administration of a diet rich in this food essential.

It does, however, respond slowly to treatment, the chief measures being: general care of the eyes and intestinal tract, and the administration of cod liver, liver, thyroid extract, and salts. The prognosis as regards sight is bad if both cornea are attacked before treatment is commenced. The condition is undoubtedly preventable, but the problem of its prevention, like so many of the great health problems of Southern India, largely resolves itself into an economic one, to be dealt with by the financial rather than the medical authorities. D. F. H.

Kleefeld, G. Physiologic and Pathologic Pupillometry. A new method of measuring the photomotor reflex of pupil. Ann. d'Ocul., 1921, v. 158, p. 262-304.

In this, the third part of his work (Ann d'Ocul. 1921, v. 158, p. 4) the author analyzes his findings under the following heads:

(1) The normal eye. Each pupil has a certain period of contraction, which varies according to the variations of the extent of the dilatation. In each case, there is a certain period of latency, and the time of the contraction is proportional to its amount. For each eye there is a certain rapidity for each stimulus.

(2) The pathologic eye. (a) Albinism: Owing to the absence of pigment and the slight development of the

iris musculature, the pupillary reactions require a considerable time. (b) Hyperopia: Nothing of importance. (c) Myopia: Similar to albinism. (d) Cataract. Altho the intensity of light is diminished, it is diffused so that a greater number of retinal elements are stimulated. The reactions should be at least as good as that of a normal eye, if the operation is to be successful. (e) Amblyopia ex anopsia: The reactions are about the same as those of a normal eye. Even in a case of functional destruction of the macula, the reactions were perfect even when the blind area was stimulated. (f) Anatomic destruction of the macula: In such a case, there were no reactions when the macula alone was stimulated. The pupillometer is adapted for determining hemianopsias and scotomata in the visual field. (g) Optic neuritis: If this is unilateral, the reaction is less pronounced and prolonged, while the consensual, when the other eye is illuminated, is more pronounced. This is true even in retrobulbar neuritis. (h) Nonsyphilitic atrophy of the optic nerve: The pupil reacts to a medium illumination, or to a brief but intense one. (i) Essential nyctalopia: The pupillary reaction is very slight and not distinct. (j) Essential hemeralopia: The reactions differ little from that of the normal eye.

(3) The eye in affections of the nervous system. Asthenopia. Nervous affections: The reaction is sometimes most pronounced, sometimes slight, occasionally normal.

(4) The eye when influenced by drugs: Cocain provokes a short period of excitation immediately after its instillation, followed shortly by a period requiring a certain duration of the stimulation.

(5) The eye in generalized syphilis: This disease acts as a constant stimulus up to the time when paralysis suddenly appears. In primary syphilis, the reaction is quicker than in the normal eye, in secondary syphilis is quicker than in primary, and in tertiary it is so rapid as to deserve the term "jumping reflex," ("reflexe sautillant"). C. L.

Candians. Arterial Anastomoses Following Embolism of the Central Artery. Arch. di Ott., 1921, v. 28, p. 89-101.

The author reviews a case which he published with Rados a short time before. This was of a woman with an embolism of the central artery of the retina, in whom, a few days after the embolism occurred, a small cilio-retinal vessel was seen to anastomose with the superior temporal artery above the macula, and to become greatly enlarged. Vision recovered to 6/60 and most of the retina assumed a normal appearance.

The second case was seen only a few weeks after this, and was in a woman of 24 with a typical embolism of the central artery. She was treated by paracentesis at the time of her first appearance. Two days after this, some very small vessels extending temporally from the edge of the nerve were seen to become more prominent; and during daily observation, these were seen to dilate markedly and to connect with the inferior and superior temporal arteries respectively.

The author believes the increase in size of the arteries in the second case is due to deep anastomoses with choroidal vessels and therefore different from the first case, in which the anastomosis was of the peripapillary network of Zinn. A few cases like the first have been described and a number of cases of venous anastomosis; but the author believes the second case is unique in the literature. S. R. G.

Kafka, P. Epibulbar Melanosarcoma and Radium Therapy. Wien. med. Woch., 1921, p. 1060.

Report of a case of melanosarcoma affecting the whole of the conjunctiva, which was almost black and grew upon the cornea. After five exposures to the X-rays (not radium as the title would indicate) in intervals of three to four weeks and of thirty to forty minutes duration, the tumor became flattened, and the scleral conjunctiva and the conjunctiva overlapping the cornea became clearer. Future references on the results will be given later. H. A.

Kramer, R. Keratomalacia in Erythrodermia Desquamativa. Wien. med. Woch., 1921, p. 1063.

Kramer reports the case of an infant which fourteen days after birth became affected with erythrodermia desquamativa. Thirteen weeks later a croupous conjunctivitis with xerosis of the bulbar conjunctiva developed, with extensive infiltrations of the cornea with superficial loss of tissue. Improvement of the general condition caused the erythrodermia to improve, good vision resulting. H. A.

Lauber, H. Treatment of Superficial Affections of the Cornea with Radium. Wien. med. Woch., 1921, p. 1066.

Lauber reported three cases of recurrent keratitis which resisted the usual treatment, until radium was used. He employs radium emanations to recurrent erosions of the cornea, herpes corneae, dystrophia epithelialis corneae (Fuchs), keratitis punctata superficialis, etc. H. A.

Lindner, K. On Ophthalmia of the Newly Born. Wien. med. Woch., 1921, p. 1068.

According to Lindner, a number of cases of ophthalmia neonatorum are not due to the gonococcus of Neisser, but to virus from the genitals of the mother, which during birth are deposited upon the conjunctiva of the new born. This ophthalmia he calls "inclosure" blennorrhea or ophthalmia. It appears at the earliest on the fifth day, but generally on the seventh or eighth day, while the gonoblennorrhea begins rarely after the fourth day. H. A.

Meller, J. Intraocular Pressure After Extraction of Senile Cataract. Wien. med. Woch., 1921, p. 1070.

After extraction of senile cataract, one occasionally encounters intraocular pressure due to various causes, for instance cyclitis, iridocyclitis with exudation into the anterior chamber, circular synechiae of the pupil with the capsule of the lens, synechiae of the iris in the incision, synechiae of the iris with the cornea. Aside from this secondary glaucoma, primary glaucoma occurs without any apparent cause, either in the acute form, or, which is more frequent, in the chronic form. But also this glaucoma is secondary; as probably in this case the anterior chamber is not reestablished in due time, possibly thru remnants of lenticular matter in the wound, retarding the agglutination of the edges of the wound, which can also have the effect of attaching the iris into the angle of the chamber. H. A.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn.; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. Edward D. LeCompte, Salt Lake City.

DEATHS.

Dr. A. Del Monte, professor of ophthalmology at the University of Naples.

Dr. John Herbert Claiborne, New York, aged sixty-one, died May twenty-seventh, from heart disease.

Dr. Daniel B. Smith, Cleveland, aged seventy-one, died May nineteenth.

Dr. John R. Robinson, Colorado Springs, Colorado, aged sixty-six, died at St. Joseph, Michigan, May tenth.

Dr. Alfred Helmholtz, New York City, aged forty-nine, died May eighth from an overdose of poison.

PERSONALS.

Dr. Francisco Matanzo, of New York, is visiting in Porto Rico.

Dr. Wm. H. Minton has been recently appointed ophthalmologist of State Hospital Number Two, St. Joseph, Missouri.

Dr. Mary E. Brydon, of the State Board of Health of Virginia, has been appointed one of the commissioners at large to investigate the feasibility of establishing separate schools for the deaf and blind.

During the visits of Mr. Treacher Collins of London, Professor Mackay of Edinburgh, Professor Magitot of Paris, for the International Congress of Ophthalmology, a luncheon was given to them at his country home by Dr. S. Lewis Ziegler.

Dr. George E. de Schweinitz, President of the American Medical Association, has accepted the invitation to deliver the Bowman Lecture in London, in 1923. He was also honored recently by promotion to Brigadier General in the Medical Reserve Corps.

Dr. Wm. Campbell Posey, of Philadelphia, gave a luncheon at the University Club, in honor of Professors Rochat, Gallemaerts, Gullstrand and Dr. Elliot, Dr. Clegg and Dr. Nordenson. A luncheon was given the same group of ophthalmic surgeons by Dr. G. Oram Ring, at the Union League.

Dr. Thomas Hall Shastid, of Superior, Wisconsin, received, at the recent Commencement of the University of Wisconsin, the honorary degree of Doctor of Science. Dr. Shastid was given a luncheon by the eye, ear, nose and throat men of Madison, following the commencement exercises, and a dinner by the Medical Faculty of the University.

SOCIETIES.

The tenth annual session of the Pacific Coast Oto-Ophthalmological society will be held in Salt Lake City, September 14-16, the week preceding the meeting of the American Academy of Ophthalmology at Minneapolis.

The Sioux Valley Eye and Ear Academy held its meeting at the Hotel Fontanelle, Omaha, Nebraska, Tuesday, July eleventh. Clinics were held in connection with the session at the various hospitals of the city during the forenoon.

The Brooklyn Ophthalmological Society was organized May ninth. The officers elected were: President, Dr. Joseph E. Golding; Vice-President, Dr. Ralph I. Lloyd; Secretary-Treasurer, Dr. Willis M. Bardner. Membership is limited to oculists resident on Long Island.

At the annual meeting of the American Ophthalmological Society held in Washington, May 1-3, the following officers were elected for the ensuing year: President, Dr. William H. Wilmer, Washington, D. C.; Vice-President, Dr. Alexander Duane, New York; Secretary-Treasurer, Dr. Thomas B. Holloway, Philadelphia.

At the annual convention of the Ophthalmological Society of the United Kingdom, held May eleventh, in London, the following officers were elected: President, Dr. A. Maitland Ramsay; Vice-presidents, Drs. J. H. Fisher, Sir John H. Parsons, Harold Grimsdale and Cyril Walker; Secretaries, Drs. J. F. Cunningham and R. Foster Moore, and Treasurer, Sir Arnold Lawson.

OPHTHALMOLOGY AND MEDICAL STUDIES.

Now that all scientific societies are discussing new regulations to govern medical studies, the Belgian Society of Ophthalmology has expressed the wish that the resolutions quoted herewith concerning the study of ophthalmology be adopted: Members of the Belgian Society of Ophthalmology, after careful study of the report made by the committee appointed by the Royal Academy of Medicine to study reforms to be introduced in the curriculum of medical studies, believe that the importance of the ophthalmologic clinic should not be curtailed, for these reasons: 1. Cases of disease of the eyes are very frequent, always serious and often grave. 2. City practitioners can send their patients to specialists, while those who practice in the country or in small towns cannot do so, and they form the majority. It is of utmost importance that they acquire sufficient ophthalmologic knowledge if serious consequences are to be prevented. 3. If we take into account that clinical and operative demonstrations are given only to a small number of pupils at a time, that students must be given individual attention in the various methods of examination, and that it would be a mistake to reduce the time devoted to clinical teaching, as clinical studies are the aim of all medical studies, we can conclude that the two years' study of this branch of medicine is not too much.

MISCELLANEOUS.

The New York Association for the Blind received a bequest of $5,000 by the will of Miss Lucy Kirtland.

The new Eye, Ear, Nose and Throat Hospital, under construction in New Orleans, was opened for inspection, May twelfth.

Miss Catherine Genin Burke of Chicago, who is blind, has thru her high grade in scholarship, qualified for election to Phi Beta Kappa, at Barnard College.

The National Committee for the Prevention of Blindness has announced that the entire subject of eye hazards in industrial occupations will be brought up to date in a revised edition of Bulletin 12 to be published in the fall.

One hundred and ten doctors took Professor Fuchs' course at Chicago. Of these, eighty-six were from Illinois (76 from Chicago); one from California, two from Colorado, three from Indiana, two from Kansas, two from Michigan, one from Minnesota, two from Nebraska, two from North Dakota, two from Ohio, one from Oregon, two from Utah and four from Wisconsin.

Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 217 Imperial Building, Denver, Colorado.

DIAGNOSIS.

Bodenheimer. Stigmatometers. Berlin Ophth. Soc., March, 1922. Klin. M. f. Augenh., 1922, v. 68, p. 650.

Dimmer, F. Diagnostic difficulties in ophthalmology. Wien. med. Woch., 1922, v. 72, p. 638.

Ewing, A. E. Value of letters and characters as visual tests. Inter. Congress of Ophth., April, 1922. A. J. O., 1922, v. 5, p. 497.

Ferree, C. E., and Rand, G. Illuminated perimeter with campimeter features. (5 ill.) A. J. O., 1922, v. 5, pp. 455-465.

Gullstrand, A. Diaphragm lamps in ophthalmology. Intern. Congress of Ophth., April, 1922. A. J. O., 1922, v. 5, pp. 492-497.

Kraupa, E. Examination of corneal nerves and corneal degeneration with slit lamp. Klin. M. f. Augenh., 1922, v. 68, p. 448.

Lauber, H. Slit lamp microscopy in red free light. Wien. klin. Woch., 1922, v. 35, p. 407.

Peter, L. C. Standards for field taking. Intern. Congress of Ophth., April, 1922. A. J. O., 1922, v. 5, p. 499.

Rochon-Duvigneaud. Method of determining visual fields in vertebrates. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 475.

THERAPEUTICS.

Nowak, E. Results of treatment of tuberculous lesions by partial antigen. Zeit. f. Augenh., 1922, v. 47, pp. 320-351.

Salvarsan therapy. Zeit. f. Augenh., 1922, v. 47, pp. 355-359.

Sgrosso, S. Retrobulbar injections in ocular therapeutics. Arch. di Ottal., 1922, v. 29, pp. 131-144; 173-182.

OPERATIONS.

Duverger. Systematic regional anesthesia. Soc. Franç. d'Opht., 1922, May. Ann. d'Ocul., 1922, v. 159, p. 476.

Merz-Weigandt, C. Hair sutures. Klin. M. f. Augenh., 1922, v. 68, p. 637.

PHYSIOLOGIC OPTICS.

Dor, L. Reflex directing eyes in reading. Ann. d'Ocul., 1922, v. 159, p. 474.

Guist, E. Geometric foundation of paralactic displacement. Zeit. f. Augenh., 1922, v. 47, pp. 257-268.

Polack. Distinct vision in spite of ocular chromatism. Ann. d'Ocul., 1922, v. 159, p. 474.

Robinson, S. H. Torsion and law of Listing. Arch. of Optometry, July, 1922, pp. 109-124.

Schanz, F. Theory of vision. Zeit. f. Augenh., 1922, v. 47, pp. 351-355.

Tscherning. Photometric glass. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 475.

Werbitzky, W. K. Schematic eye. (2 ill. bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 588-598.

Weckert. Trifocal glasses. Klin. M. f. Augenh., 1922, v. 68, p. 638.

REFRACTION.

Belehradek, J. Experimental transient astigmatism from strain of ciliary muscle. Casopis Lek. Ceskych Prague, 1922, v. 61, p. 81.

Bestor, H. M. Relationship between accommodation and convergence. Arch. of Optometry, July, 1922, pp. 134-143.

Druault-Toufesco, S. Myopia. (10 ill. bibl.) Ann. d'Ocul., 1922, v. 159, pp. 321-364.

Elschnig, A. Treatment of myopia. Med. Klin., 1922, v. 18, pp. 683-685.

Enroth, E. Transitory hyperopia in diabetes. Acta Med. Skandin., 1922, v. 56, p. 500. Abst. Intern. Med. and Surg. Survey, 1922 (8a, 627).

Hegner, C. A. Action of spectacles. Schweiz. med. Woch., 1922, v. 52, p. 302. Abst. Intern. Med. and Surg. Survey, 1922 (8a, 620).

Jablonski, W. Hereditary myopia. (bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 560-573.

Keyms, J. Axis of astigmatism and its location. Brit. Med. Jour., 1922, May 27, p. 838.

Levinsohn, G. Motion of optic nerve and genesis of myopia. Klin. M. f. Augenh., 1922, v. 68, pp. 574-577.

McFadden, F. Refraction of cornea. Arch. of Optometry, July, 1922, pp. 143-149.

Olsho, S. L. Protractor card for verifying axes of cylindric lenses. (3 ill. bibl.) A. J. O., 1922, v. 5, pp. 451-454.

Peckham, R. M. Vertex diopter. Arch. of Optometry, July, 1922, pp. 124-134.

OCULAR MOVEMENTS.

Aubaret. Syndromes of strabismus. Marseille Méd., 1922, v. 59, p. 289. Abst. Intern. Med. and Surg. Survey, 1922 (8a, 638).

Ballantyne, A. J. What is heterophoria? Glasgow Med. Jour., 1922, v. 15, pp. 321-329.

Barton, M. H. Diplopia in general practice. Clin. Jour., 1922, May 31, pp. 257-262.

Bielschowsky, A. Genesis of abnormal convergent positions of eyes. Arch. f. Psychiat. u. Nerv., 1922, v. 65, p. 127. Abst. Intern. Med. and Surg. Survey, 1922 (8a 633).

Cantonnet, A. Stereoscope of Pigeon and strabismus. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 475.

Coppez, H. Electric lamp in diagnosis of diplopia. Clin. Opht., 1922, v. 26, p. 258.

Ellett, E. C. Unilateral nystagmus. (Dis.) A. J. O., 1922, v. 5, p. 483.

Freytag, G. T. Bilateral trochlearis paralysis. (1 ill. bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 452-460.

Kleyn, A., de. Vestibular ocular reflex. (4 ill.) Graefe's Arch. f. Ophth., 1922, v. 107, pp. 480-488.

Jackson, E. Wearing of correcting prisms. A. J. O., 1922, v. 5, pp. 500-501.

Luedde, W. H. Amblyopia ex anopsia and recovery of vision. (Dis. p. 391, bibl.) A. J. O., 1922, v. 5, pp. 441-451.

Nishi, L. Comparative anatomy of muscles of eye. Arbeit. a. d. Anat. Inst. Sendai, Japan, 1922, April 5, p. 65.

Ourgaud, G. Genesis of concomitant strabismus. Marseille Méd., 1922, v. 59, p. 310. Abst. Intern. Med. and Surg. Survey, 1922 (8a 639).

Ourgaud, G., and **Sedan, J.** Converging spasm with contractions of orbicularis with mastication. Marseille Méd., 1922, v. 59. p. 327. Abst. Intern. Med. and Surg. Survey, 1922 (8a 637).

Percival, A. S. First report of miners' nystagmus committee. Lancet, June 10, 1922, p. 1168.

Miners' nystagmus. Brit. Med. Jour., June 10 and 17, 1922, pp. 932-936.

Report on miners' nystagmus. Brit. Jour. Ophth., 192, v. 6, pp. 262-266.

Scharnke. Neurologic significance of nystagmus. Arch. f. Psychiat. u. Nerven., 1922, v. 65, p. 249. Abst. Intern. Med. and Surg. Survey, 1922, (8a 646).

Sedan, J. Modification of diplopia in strabismus. Marseille Méd., 1922, v. 59, p. 315. Abst. Intern. Med. and Surg. Survey, 1922 (8a 636).

Tristaino, B. Interstitial myositis of syphilitic nature. Gior. di Ocul., 1922, v. 3, p. 45. Abst. Intern. Med. and Surg. Survey, 1922 (8a 632).

Wilson, J. A. Miners' nystagmus. Lancet, June 24, 1922, p. 1270.

CONJUNCTIVA.

Aubaret. Neoplastic pterygium. Marseille Méd., 1922, v. 59, p. 385. Abst. Intern. Med. and Surg. Survey, 1922 (8a 660).

Colmant, J. Treatment of phlyctenular keratoconjunctivitis. Clin. Opht., 1922, v. 26, p. 255.

Fischer, E. Streptococcus mucosus in chronic ulcerous conjunctivitis. (bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 553-556.

Kalt. Follicular conjunctivitis after baptism in pool. Soc. d'Opht. de Paris, March 18, 1922. Ann. d'Ocul., 1922, v. 159, p. 399.

Kleczkowski, F. Suture in resection of conjunctival fornix. (bibl.) Clin. Opht., 1922, v. 26, pp. 250-254.

Lahm, W. Pathologic anatomy of ophthalmoblennorrhea. Arch. f. Gynaek., 1922, v. 115, p. 611. Abst. Intern. Med. and Surg. Survey, 1922 (8a 667).

Liebermann, L. v. Resection of tarsal conjunctiva in vernal conjunctivitis. Klin M. f. Augenh., 1922, v. 68, p. 617.

Marcotty, A. H. Bone formation in conjunctiva from caterpillar hairs with changes in cornea. (3 ill. bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 443-448.

Martin, E. S. Sophol in prophylaxis. Klin. Woch. 1922, v. 1, p. 733. Abst. Intern. Med. and Surg. Survey, 1922 (8a 668).

Petit, P. J. Trachoma in Tunis. (3 ill.) Ann. d'Ocul., 1922, v. 159, pp. 365-386.

Pillat, A. Bacteriology of pneumococcus conjunctivitis. (4 ill.) Klin. M. f. Augenh., 1922, v. 68, pp. 533-553.

Saathoff, L. Conjunctivitis an early symptom of tuberculosis. Münch. med. Woch., 1922, v. 69, p. 460.

Sedan, J. Scrubbing treatment of trachoma after Trantas. Marseille Méd., 1922, v 59, p. 344. Abst. Intern. Med. and Surg. Survey, 1922 (8a 673).

Curry comb curet for trachoma. Marseille Méd., 1922, v. 59, p. 346. Abst. Intern. Med. and Surg. Survey, 1922 (8a 672).

Thomas, H. G., and **Baxter, F. S.** Monocular trachoma. A. J. O., 1922, v. 5, p. 470.

Tooker, C. W. Trachomatous pannus and ulcer treated with tinctur of iodin. (Dis.) A. J. O., 1922, v. 5, pp. 480-482.

CORNEA AND SCLERA.

Arana, J. de. Treatment of serpiginous ulcer of cornea. España Oft., 1922, v. 7, pp. 61-70.

Besso, M. Eczematous keratoconjunctivitis. Gior. di Ocul., 1922, v. 3, p. 51. Abst. Intern. Med. and Surg. Survey, 1922 (8a 677).

Calzavara, G. Macroscopic findings on corneas exposed to vaccine and chicken pox virus. Igiene Mod., 1922, v. 15, p. 44. Abst. Intern. Med. and Surg. Survey, 1922 (8a 686).

Flieringa, H. J. Annular abscess of cornea. Nederl. Tijschr. v. Geneesk., 1922, i, p. 1408. Abst. Intern. Med. and Surg. Survey, 1922 (8a 683). J. A. M. A., 1922, v. 78, p. 1938.

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Lehrfeld, L. Superficial punctate disease of cornea. (Dis.) A. J. O., 1922, v. 5, p. 486.

Munoz Urra, F. Traumatic corneal ectasia. (5 ill. bibl.) Arch. de Oft. Hisp.-Amer., 1922, v. 22, pp. 242-250.

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Vegni, R. Experimental herpetic infection of cornea. Riformi Med., 1922, v. 38, p. 270. Abst. Intern. Med. and Surg. Survey, 1922 (8a 678).

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Induced inequality of pupils and early diagnosis of pulmonary tuberculosis. New York Med. Jour., 1922, June 21, p. 774.

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Oloff. Hemianopic pupil reaction. Münch. med. Woch., 1922, v. 69, p. 462.

Saupe, K. Malformation of dilatator pupil muscle. Klin. M. f. Augenh., 1922, v. 68, pp. 464-471.

THE UVEAL TRACT.

Aubaret. Congenital infantile iridochoroiditis. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 477.

Blue, J. B. Bilateral aniridia. (Dis.) A. J. O., 1922, v. 5, p. 483.

Brandes. Acute chorioretinitis of ethmoidal origin. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 465.

Dupuy-Dutemps. Acute infectious iridochoroiditis. Soc. Franç. d'Opht., 1922, May. Ann. d'Ocul., 1922, v. 159, pp. 447-458.

Jeandelize, P., and Bretagne. Metastatic choroiditis in infant. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 459.

Jocqs, R. Chronic uveitis. Clin. Opht., 1922, v. 26, pp. 243-250.

Meller, J. Detachment of retina in iridocyclitis. (3 ill.) Zeit. f. Augenh., 1922, v. 47, pp. 247-257.

Tuberculosis of choroid. Zeit. f. Augenh., 1922, v. 47, pp. 5-19.

Rae, L. Choroiditis. (Dis.) Royal Soc. Med., Sec. on Ophth., 1922, March. A. J. O., 1922, v. 5, p. 475.

Roche, C. Diffuse choroiditis in old people. Ann. d'Ocul., 1922, v. 159, p. 478.

Tooker, C. W. Recurrent cyclitis following sphenoiditis. A. J. O., 1922, v. 5, p. 482.

Triebenstein, O. Congenital anomalies of iris. (2 ill. bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 578-587.

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Aubaret and Ourgaud. Ophthalmic zona and glaucoma. Marseille Méd., 1922, v. 59, p. 342. Abst. Intern. Med. and Surg. Survey, 1922 (8a 713).

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